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ABSTRACT

The intent of this guide is to extend the 1977 document, "A Framework for Environmental Education in the Public Schools of Hawaii," (ED 196 726) so as to provide more specific guidelines for teachers and administrators. Chapter I contains introductory material pertaining to the guiding principles and rationale for environmental education. In the second chapter, overall goals, objectives and competencies are presented along with a scope and sequence model and descriptions of the desired characteristics of programs and personnel. Chapter III describes the content of environmental education by concepts, subjects, and areas of concern. Chapter IV contains a set of instructional goals and attendant objectives which integrate the concepts and issues to provide an approach for classroom use. This chapter also includes a chart matching performance expectations with instructional objectives. Presented in the Appendix are definitions and discussions of environmental terms and issues, descriptions of resource materials, and a list of environment-related agencies and organizations. (Author/WB)

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Environmental Education

K-12 Curriculum Guide

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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March 1981

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Foreword

Both the Congress of the United States and the Legislature of the State of Hawaii have established polices and laws calculated to create and maintain conditions under which humans and nature can exist in productive harmony and which will ensure fulfillment of the social, economic, and other needs of present and future generations. This formal recognition of the environment and its relationship to human beings has occurred relatively recently because, suddenly and rather dramatically, we have been made aware of the impact of technology on the environment and the limited carrying capacity of Earth.

Educators for many years have been helping students to gain knowledge about the components of a variety of environments in which they function. Until recently, however, little or no attention was directed toward developing an understanding of human effect on environments or the limits of environments to sustain life--human or otherwise. Prior to 1969, Environmental Education was generally called outdoor education and consisted primarily of a study of plants and non-human animals, geological or geographical features, meteorological or physical phenomena. The need to recognize humans as major components of all environments and the detrimental effects on those environments that humans are capable of producing without conscious consideration of their actions has led to the establishment of new programs appropriately called Environmental Education.

In September of 1977 the Department of Education, State of Hawaii, published a document called A Framework for Environmental Education in the Public Schools of Hawaii. This Framework stated the rationale for Environmental Education, established the program goal with objectives leading to attainment of that goal, and set forth a set of concepts and issues to be developed in the K-12 continuum. This document set the base upon which the Department's Environmental Education Program is being built.

This curriculum guide is designed to extend the Framework to provide more definite guidelines to help teachers and administrators implement Environmental Education in the public schools of Hawaii.

Charles G. Clark, Superintendent

ACKNOWLEDGMENTS

The Environmental Education K-12 Curriculum Guide is the result of the cooperative efforts of the members of the Committee for Environmental Education. This committee which consists of school, district, and state level Department personnel, University of Hawaii faculty, and community representatives spent many long hours developing this guide to help teachers and administrators promote the goal and objectives of the Department's Environmental Education Program.

Portions of this guide were adapted from two documents: Fundamentals of Environmental Education, U. S. Department of Health, Education, and Welfare/ Education Division, Nov., 1976, and Equinox, A Model for the Environmental Education Curriculum for Kindergarten Through Grade Twelve in Delaware's Schools, the Delaware State Department of Public Instruction in cooperation with the Del Mod System, Jan. 1, 1975.

Members of the Committee for Environmental Education

Mr. Peter Apo
Waianae Hawaiian Heritage
Cultural Center, Inc.

Dr. William Boyer, Chairman
Department of Education Foundations
University of Hawaii

Mr. Kerry Chesser
Science Teacher
Kalaheo High School

Mrs. Pat Chesser
Psychology Teacher
Kalaheo High School

Miss Minnie Fujita
Educational Specialist
Honolulu District Office

Mrs. Pearl Ching
Educational Specialist
Office of Instructional Services

Mrs. Thelma Hara (deceased)
Educational Specialist
Windward District Office

Dr. Dennis Hirota
Vice President
Sam O. Hirota, Inc.

Miss Ann Kawasaki
Office of Environmental
Quality Control

Mr. Floyd Larson
Intermediate Teacher
Aiea Intermediate School

Mrs. Lucas Matsumoto
Intermediate Teacher
Aiea Intermediate School

Mrs. Nellie Matsunami
Educational Specialist
Windward District Office

Mr. Francis Oliveira (retired)
Former Principal
Jefferson Elementary School

Mrs. Rose Pfund
Sea Grant College Program
University of Hawaii

Mrs. Judith Balthrop
Educational Specialist
Environmental Education
Office of Instructional Services

Dr. Francis Pottenger
Professor of Education
University of Hawaii

Mr. Gregory Rhodes, Project Manager
Curriculum Research & Development
University of Hawaii

Mr. Roy Takayama
Science Resource Teacher
Honolulu District

Mrs. Lorraine Tokuyama
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Mr. Ronald Toma
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Mrs. Marilyn Tomita
Secondary Teacher
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Secondary Teacher
Waipahu High School

Mrs. Barbara Yamamoto
Intermediate Teacher
Aiea Intermediate School

The draft version of this document has been reviewed by many individuals in schools, district offices, and the Office of Instructional Services. Their generous reviews and comments have resulted in new perceptions and ideas which have been incorporated into this guide.

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Chapter I

INTRODUCTION

In the document A Framework for Environmental Education in the Public Schools of Hawaii, the goals and objectives for the Environmental Education Program as well as the concepts and issues to be addressed by the program are set forth. While the Framework presents a skeleton upon which the instructional program may be built, it must be fleshed out to fully implement the program. This guide is the result of an effort to build a complete Environmental Education Program.

Organization

The guide is organized into four chapters and an appendix. Chapter I contains introductory material, to give the reader a basic understanding of environmental education.

Chapter II of this guide contains the Foundation Program Objectives, Essential Competencies, and program goal with the objectives leading to attainment of that goal, and performance expectations which are statements of learner outcomes based on the program objectives. The relationships between the Foundation Program Objectives, Essential Competencies, and the performance expectations are displayed in this chapter as well as descriptions of the desired characteristics of environmental education activities and the personnel involved in implementing those activities.

Chapter III contains the concepts and areas of environmental concern which make up the content of the instructional program.

Chapter IV contains a set of instructional goals and attendant objectives which integrate the concepts and issues to provide a way of approaching the concepts and issues for classroom use. A chart displaying the performance expectations matched with the instructional objectives has also been included in this chapter.

In the appendix of the guide, additional information has been included to provide the reader a clearer picture of environmental education and resources to obtain further information on environmental matters. "Fundamentals about the Environment and Humans' Relation to the Environment" contains background information for environmental education. A list of major environmental topics and definitions is included in the appendix. This list should not be considered complete as emerging environmental issues will sometimes necessitate new terms; however, the list should be a help in clarifying the current environmental picture. A bibliography of books used in the development of this guide may be found in the appendix as well as lists of environmentally concerned groups and organizations and environmentally related periodic publications.

A RATIONALE FOR ENVIRONMENTAL EDUCATION

Since the late 1960's there has been a heightened awareness of a host of problems stemming from uncontrolled technological impact on global ecology. These problems can be categorized into resource depletion, exploding human population, pollution of the global environment, inadequacy of environmental knowledge and others. Collectively these have become known as environmental

problems. Unlike many other societal problems that seem subject to solution, environmental problems threaten to become perennial. Further, there are already many aspects of these environmental problems which have become critical and many others which must at least be characterized as pressing. In some cases environmental problems threaten the survival of entire species, including our own. In others, they threaten to impair most of the quality of planetary life.

The profundity of these problems has brought about a national as well as a local call for educational programs that will prepare our citizenry to cope rationally and effectively with both current problems and those that may loom in the future.

Operational Definitions

ENVIRONMENT

The term environment is variously used in educational, popular, and technical literature. Each use has particular meaning to a specific group and understanding of such particularities is a function of education. However, there are some broad characteristics of environment that can be identified as common to most uses. These are:

- An environment is a place. It is a region, setting or context, real or imagined. It may be internal to an object or organism or external to it. It may be microscopic, macroscopic. It may be immediate surroundings or rest outside the reach of human beings.
- An environment is the contents of a place. These may be physical or the products of imagination. They may be biotic matter or abiotic matter, or energy and may or may not involve humans and their artifacts.
- An environment is the dynamic processes and interactions. These are the reciprocal interworkings of the contents of a place.
- An environment is bounded by time. This is the period necessary for processes and interaction to occur and this period may be in the past, future, or present.
- An environment is a conceptual framework. It is a perception of a reality shaped by culture, personal understanding and temperament.
- An environment is a totality. It is holistic, time bound reality including substance, energy, and processes of interaction, be they physical, biological, societal, or psychological.

ENVIRONMENTAL EDUCATION

Environmental education consists of formal and non-formal educational experiences and processes which enable humans to develop awareness and understanding of the environments within which they interact, skills in coping with environmental problems and positive and value attitudes which will help them to live in harmony with the environment.

Environment education is thematic in nature. It is interdisciplinary utilizing such subject areas as science, social studies, mathematics, language and fine arts, health, physical education, and practical and industrial arts and such thematic areas as career and values education to study environmental concepts and issues.

Guiding Principles of Environmental Education

The following principles were developed and adopted by the World Intergovernmental Conference on Environmental Education, Tbilui, USSR, October 14-26, 1977 to provide guidance for environmental education programs worldwide.

Environmental education should:

1. "Consider the environment in its totality -- natural and built, technological and social, economic, political, moral, cultural and historical, and aesthetic aspects;

2. Be a continuous life-long process; it should begin at the preschool level and continue through all formal and non-formal stages;

3. Be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective;

4. Emphasize active participation in preventing environmental problems and working toward their solution;

5. Examine major environmental issues from local, national, regional, and international points of view, so that students receive insights into environmental conditions in other geographical areas;

6. Focus on current and potential environmental situations;

7. Emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills;

8. Utilize diverse learning environments and a broad array of educational approaches to teaching and learning about and from the environment with due stress on practical activities and first-hand experiences;

9. Focus on the student's own community and relate topics being discussed to state, regional, national and international issues and perspectives.

10. Relate environmental sensitivity, knowledge, problem-solving and values clarification at every grade level, but with special emphasis on environmental sensitivity to the student's own community in early years;

11. Enable students to play a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences."

Chapter II

GOALS AND OBJECTIVES

Hawaii's system of public schools exists to provide students with educational experiences which will help them to develop the full extent of their capabilities and to become useful and personally successful members of society. Students, teachers, administrators, parents, the school board and the community all have major roles in providing these experiences. All of these groups are involved in formulating and implementing the goals and objectives of any educational program. In the State of Hawaii, the Foundation Program Objectives and their concomitant Performance Expectations represent the goals of education for all public school students.

Goals and objectives may differ in the level of generality at which they describe learning outcomes. Because they differ in level of generality, goals and objectives differ in the type of planning for which they are suited. Below is a description of the goals and objectives found in this guide:

1. System Goals: The purposes and goals of Hawaii's public education system may be found in the Master Plan for Public Education in Hawaii and Student Performance Expectations of the Foundation Program.

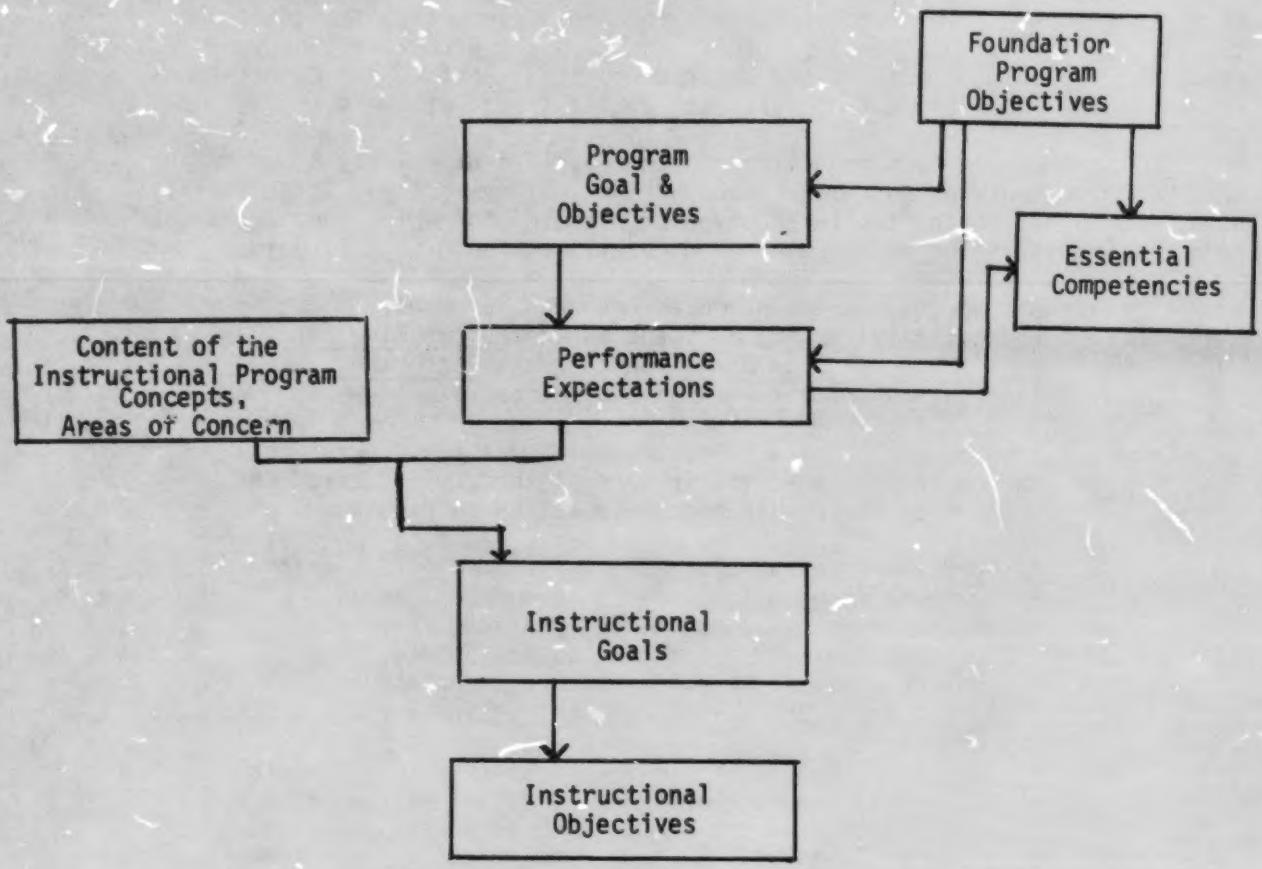
2. Program Goals: The Environmental Education Program goal and objectives describe in general terms the desired end product of the Environmental Education curriculum.

3. Performance Expectations: The Environmental Education Performance Expectations are statements of learner outcomes for grades 3, 6, 8, 10, and 12. They relate the program goal and objectives to the Foundation Program Objectives. The Performance Expectations provide a basis for developing instructional goals and objectives.

4. Instructional Goals: Since environmental education is thematic, no course goals have been developed; however, a series of instructional goals and objectives has been developed to give direction to planning activities at lower elementary (K-3), upper elementary (4-6), intermediate (7-9), and high school (10-12) levels. These goals and objectives are designed to specify desired student behaviors relative to the environmental education concepts and areas of concern integrated in light of the program goal, objectives, and performance expectations. The objectives should not be considered an exhaustive list for any of the goals. Endless possibilities exist for measurement of desired student behaviors, and teachers are encouraged to generate or modify these objectives to better meet the particular needs of their students or the environmental situation.

Development and Relationship of the Goals and Objectives*

The diagram below illustrates the development and relationship of the goals and objectives from the overall program goal to specific instructional objectives.



*See page E73 in the appendix for a sample of this relationship.

Foundation Program Objectives

The eight Foundation Program Objectives established by the Department of Education serve as the basis for curriculum and instruction in the public school. These eight objectives are:

1. Develop basic skills for learning and effective communication with others.
2. Develop positive self-concept.
3. Develop decision-making and problem-solving skills.
4. Develop independence in learning.
5. Develop physical and emotional health.
6. Recognize and pursue career development as an integral part of personal growth and development.
7. Develop a continually growing philosophy that reflects responsibility to self as well as to others.
8. Develop creative potential and aesthetic sensitivity.

Essential Competencies

1. Read and use printed materials from daily life. These include the newspaper, telephone book, road maps, charts and graphs commonly used in public media, and household product instructions.

2. Complete commonly used forms. These include personal checks, job applications, charge account applications and other similar forms.

3. Demonstrate writing skills commonly used in daily life. These include writing directions, telephone messages, letters of inquiry or complaint, and personal correspondence.

4. Communicate orally in situations common to everyday life. These include giving simple directions and answering questions about directions or instructions, expressing personal opinions on a topic and responding to questions about the topic, and describing an object.

5. Use computational skills in situations common to everyday life. These include adding, subtracting, multiplying, and dividing whole numbers, adding and subtracting dollars and cents, and computing discount and simple interest.

6. Read and use scales on standard measuring devices. These include rulers, meauring cups and spoons, thermometers and weight scales.

7. Interpret common visual symbols. These include traffic signs and road markings, directions to public facilities, and caution and warning labels and signs.

8. Reach reasoned solutions to commonly encountered problems. Reasoned solutons are those that incorporate the facts at hand, the constraints on the soluton, the feasibility of carrying out the solution, and the values of those affected by the solution. Commonly encountered problems include decisions about family finance, career plans, physical health, and community issues.

9. Distinguish fact from opinion in TV and radio news broadcasts, advertising, newspaper and magazine articles, and public speeches.

10. Use resources for independent learning. These resources include the library, informed persons, and public and private agencies.

11. Identify the harmful effects of smoking, drinking, drug abuse, over-eating, insufficient sleep, poor personal hygiene, and poor nutrition.

12. Identify the training, skill and background requirements of at least one occupation in which the student is interested.

13. Demonstrate knowledge of the basic structure and functions of national, state and local governments.

14. Demonstrate knowledge of the citizen's opportunities to participate in political processes. These include voting, running for office, contacting elected representatives, and participating in election campaigns.

15. Demonstrate knowledge of important citizen rights and responsibilities. This includes the rights guaranteed by the Constitution and knowledge of traffic laws and major criminal offenses.

Program Goal

The goal of Environmental Education is to develop an environmentally literate and enlightened society which, through its ethical commitment to wise use of its resources, creates and maintains optimum quality in both human-made and natural environments.

Objectives

To achieve the goal of Environmental Education in Hawaii, it will be necessary to attain certain objectives during the period of formal education. No list can be assumed complete, for the dynamics of the environment suggest a need for constant re-evaluation and refinement. For this beginning stage, however, the following environmental education objectives can be stated and made to serve as focal points for the various school levels.

Objective 1. Students should develop awareness of themselves in relation to their environment and the need for wise use of the environment.

Subobjectives:

- Develop awareness of the grandeur, delicacy and beauty of the world in in which we live.
- Develop awareness of change, past and present, and the agents of change working within environments.
- Develop awareness of the role played by humans and their artifacts within environments.
- Develop awareness of the capacities and limits of humans to control environments.
- Develop awareness of the effect of the environment on humans and humans' effect on the environment.
- Develop awareness of the role of social institutions in regulating human interaction within the environments.
- Develop awareness of the holistic interaction of biophysical, chemical, and mechanical factors within the environments.
- Develop awareness of non-polluting, recreational opportunities afforded by environments.

Objective 2. Students should develop knowledge of the various aspects of the environment--land, water, sea, air, other eco-systems--and the inter-relatedness of human beings, environmental concerns and the social, political, cultural and economic structures.

Subobjectives:

- Develop understanding of the academic disciplines that study aspects of environments.

- Develop understanding of the technologies that deal with the manipulation of environments and those that provide tools for regulation and control of such manipulation.
- Develop understanding of the natural principles that govern the interaction of the biophysical, chemical, and mechanical entities of the environments.
- Develop understanding of the social principles of economics, politics, culture, law, and management which bear on environments.
- Develop understanding of the literature and history of human interaction within environments.
- Develop understanding of the aesthetic dimensions of human interactions within environments.
- Develop understanding of the influence of environments on individuals and cultures.
- Develop understanding of the occupational opportunities associated with environments.
- Develop understanding of the vehicles of participation in decisions pertaining to environments.

Objective 3. Students should develop skills in coping with environmental problems.

Subobjectives:

- Acquire skills in seeking knowledge about environments.
- Acquire skills in rational consideration of alternatives and making judgments concerning issues of environmental consequence.
- Acquire skills in the wise and positive use of environments.

These subobjectives involve a variety of specific skills including the ability to:

- Find and use a variety of sources of information.
- Judge the validity of information.
- Evaluate information using appropriate criteria.
- Use data collection and sampling techniques.
- Record data accurately.
- Interpret data.
- Make inferences and predictions.
- Formulate operational definitions.
- Interpret time and space relations accurately.
- Measure quantities accurately.

- Make effective use of the senses in observation.
- Describe phenomena accurately and succinctly.
- Use appropriate language and artistic skills in communication.
- Formulate problems.
- Recognize the interrelatedness of various factors in environmental problems.
- Construct models.
- Formulate hypotheses.
- Perform scientific experiments.
- Use appropriate social and cultural skills in problem-solving situations.
- Perform planning functions concerning environments.

Objective 4. Students should develop attitudes and values which will help them to live in harmony with the environment.

Subobjectives:

. Develop confidence in the ability of humans to solve environmental problems.

. Develop a positive ethical stance concerning wise human use of environments.

. Develop a concern for and commitment to participation in actions necessary for wise use of environments.

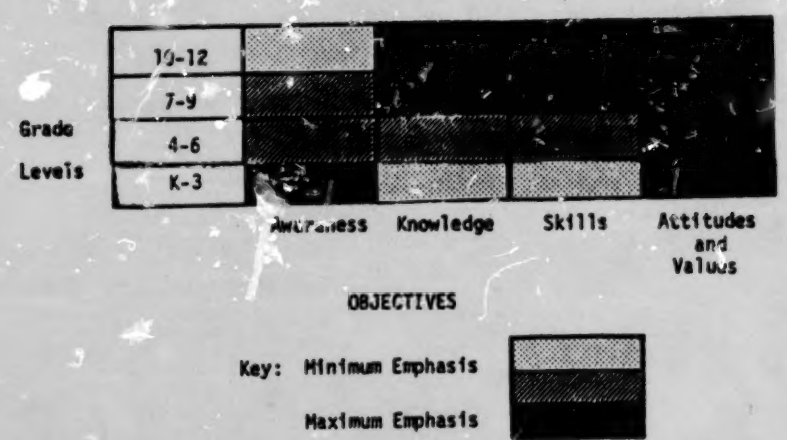
More specifically to develop these subobjectives a student must:

- Enjoy interaction with various environments.
- Appreciate natural beauty.
- Find satisfaction in living in harmony with nature.
- Value living and non-living things in the natural environment.
- Sense the need to improve humans' relation to the environment.
- Be sensitive to matters of environmental concern.
- Desire to achieve constructive solutions to environmental problems.
- Be inquisitive.

SCOPE AND SEQUENCE MODEL

The emphasis on the various components of the objectives differs with the age groups, developing from the simple to the complex. The main emphasis in learning for elementary school youngsters would be in developing awareness of themselves and their relationships to their environment and issues therein. This base will help develop appropriate behavior. In the intermediate and earlier high school levels, with the base of awareness, the emphasis would be in developing greater knowledge, skills in decision-making and coping with issues and problems related to the environment. Along with awareness skills and knowledge development, the students would be expected to acquire an ethical stance which would predispose appropriate behavior in relation to environmental concerns. In the later high school years students should acquire greater skills in handling more complex problems, a broader environmental ethic and develop a functional commitment to positive action in regard to their environment.

The scope and sequence model for environmental education curriculum is diagrammed below. The target populations to which the program is addressed are plotted on the vertical axis. The objectives are plotted on the horizontal axis. Degrees of emphasis among the varying grade levels are denoted by intensity of shading.



Use of Performance Expectations

Performance expectations are statements of learner outcomes. They serve several purposes. First, performance expectations provide a means for relating the Environmental Education Program to the Foundation Program Objectives (see page B3). Second, performance expectations provide a basis for developing instructional objectives and activities for the Environmental Education Program. Third, performance expectations provide a way to measure students' progress in achieving the goal and objectives of the program. Fourth, performance expectations provide a way of assessing student attainment of the Foundation Program Objectives.

Performance expectations provide checkpoints against which a student's progress may be measured at grades 3, 6, 8, 10, and 12. For each grade, the performance expectations are arranged in clusters. The level of difficulty increases downward within each cluster. While every student may not achieve every performance expectation in each cluster at that grade level, every student should achieve the first few performance expectations in all clusters and more advanced students should achieve the more difficult performance expectations in each cluster.

Performance expectations are linked to instructional objectives used in actual classroom situations. As teachers develop and/or use instructional objectives in planning their instructional strategies, relationships between these objectives, the performance expectations, Essential Competencies and the Foundation Program Objectives should be considered. Below is an example of an instructional objective selected from major instructional goal A of Chapter IV (page D2). The performance expectation to which the instructional objective is related has been stated and the Essential Competency and Foundation Program Objective to which the performance expectation is a contributor are listed.

Instructional Objective	Grades 4 - 6	Students will relate the increased production of energy to pollution and resource depletion.
Performance Expectation	Grade 6	Cites examples of statewide, nationwide, or worldwide environmental problems.
Essential Competency 8		Reach reasoned solutions to commonly encountered problems.
Foundation Program Objective III		Develop decision-making and problem-solving skills.

The instructional objective above was selected at random. Other instructional objectives involving recognition of environmental problems will also contribute to the attainment of this performance expectation. The instructional objective cited above will also contribute to the attainment of other performance expectations such as: Describes the impact of various industries on the environment. Other Foundation Program Objectives such as: Recognize and pursue career development as an integral part of personal growth and development can be related to the instructional objective above and performance expectations.

The above example is only a sample of the interrelationship of the instructional objectives, performance expectations, Essential Competencies, and Foundation Program Objectives. As teachers practice relating instructional objectives to performance expectations and performance expectations to Essential Competencies and Foundation Program Objectives, the process of implementing an instructional program which will help students attain the performance expectations and hence the Essential Competencies and Foundation Program Objectives will become clearer. Following the performance expectations in this chapter teachers will find three sections relating: 1) Performance Expectations and Foundation Program Objectives; 2) Performance Expectations and Essential Competencies, and 3) Performance Expectations and Instructional Objectives.

As stated earlier, the performance expectations serve as checkpoints by which a student's progress in attainment of the program goal and objectives can be measured. Assessment techniques for measuring the performance expectations include a variety of tasks which show mastery of the performance expectations. Evaluation of a student's progress in attaining instructional objectives related to each performance expectation will constitute one means of measuring the performance expectations or performance expectations may be used to generate assessment tasks directly. Measurement of the performance expectations either through instructional objectives or directly, may encompass more than one task and may be analogous to an assignment. Tasks may include paper and pencil tests, questionnaires (self-report measures), performance tests, and research papers. Subjective evaluations of a student's progress by the teacher may include observations, interviews, and record reviews.

Since each performance expectation is a contributor toward one or more Foundation Program Objective, measurement of a student's progress in attaining a performance expectation will automatically insure a degree of measurement of the student's progress in attaining the associated Foundation Program Objective.

One additional word should be mentioned about the use of performance expectations. Performance expectations not only provide a means of implementing the Department's Foundation Program Objectives but insure development of the student's learning along the K-12 continuum and reinforce program consistency throughout the many public schools in our state.

Performance Expectations

Grade 3

- Cites examples of local environmental problems.
- Identifies causes of local environmental problems.
- Cites examples of statewide, nationwide or worldwide environmental problems.

- Identifies a variety of resources that may be used to gain information on environmental matters.
- Uses a variety of resources to gain information on environmental matters.
- Conducts simple investigations to gain first-hand information on environmental matters.

- Identifies recreational opportunities in both human-made and natural environments.
- Describes the environmental factors which must be considered to conduct various recreational activities.

- Names occupations in the community that are directly dependent on various natural resources.
- Describes the natural resources needed by various industries and relates the locations of those industries to available resources.
- Cites examples of occupations that are primarily concerned with the study or control of specific environments.

- States school or home rules designed to protect the environment.
- Discusses the effectiveness of school or home rules designed to protect the environment.
- Explains the need for rules to protect the environment.

- Communicates feelings evoked by various types of environments.
- Describes the need for beauty in one's environment.
- Lists a number of environmental factors which may affect the emotional or physical health of human beings.
- Discusses attitudes which contribute toward living in harmony with the environment.

Grade 6

- Identifies causes of local environmental problems.
- Cites examples of statewide, nationwide or worldwide environmental problems.
- Cites examples of social, political, or economic decisions which have caused environmental problems.

- Identifies a variety of resources that may be used to gain information on environmental matters.
- Uses a variety of resources to gain information on environmental matters.
- Conducts simple investigations to gain first-hand information on environmental matters.
- Identifies instruments or methods that can be used to gain information about environments or to change an environment for a desired result.

- Identifies recreational opportunities in both human-made and natural environments.
- Describes the environmental factors which must be considered to conduct various recreational activities.
- Explains the effects of environmental changes on recreational opportunities.
- Explains the potential effects of changes in recreational activity on the environment.

- Names industries that are directly dependent on natural resources.
- Describes the natural resources needed by various industries and relates the locations of those industries to available resources.
- Cites examples of occupations that are primarily concerned with the study or control of specific environments.
- Describes the impact of various industries on the environment.

- Discusses the effectiveness of school or home rules designed to protect the environment.
- Explains the need for rules to protect the environment.
- Identifies state and federal government agencies primarily concerned with environmental management or control.
- Identifies non-governmental groups primarily concerned with environmental matters.

- Communicates feelings evoked by various types of environments.
- Describes the need for beauty in one's environment.
- Volunteers for school beautification projects.

Grade 6 (Cont'd)

- Lists a number of environmental factors which may affect the emotional or physical health of human beings.
- Discusses attitudes which contribute toward living in harmony with the environment.
- Cites examples of negative and positive ways human beings can change the environment.
- Identifies and describes environmental factors which influence the beliefs of different cultures.
- Identifies specific contributions one can make to help human beings live in harmony with the environment.
- Describes the effects of environmental changes on the beauty of an environment.
- Explains how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.
- Accepts leadership role in school beautification projects.

Grade 8

- Cites examples of statewide, nationwide or worldwide environmental problems.
- Cites examples of social, political, or economic decisions which have caused environmental problems.
- Describes the interrelationship of the social, political, and economic structures and environments of different societies.
- Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.
- Predicts the effects social, political, and economic changes would have on the environment.

- Uses a variety of resources to gain information on environmental matters.
- Conducts simple investigations to gain first-hand information on environmental matters.
- Describes instruments or methods that can be used to gain information about environments or change an environment for a desired result.
- Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.

- Describes the environmental factors which must be considered to conduct various recreational activities.
- Explains the effects of environmental changes on recreational opportunities.
- Explains the potential effects of changes in recreational activity on the environment.

Grade 8 (Cont'd)

- Suggests ways the environment may be improved to provide more recreational opportunities.

- Describes the natural resources needed by various industries and relates the locations of those industries to available resources.
- Cites examples of occupations that are primarily concerned with the study or control of specific environments.
- Describes the impact of various industries on the environment.
- Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries' impact on the environment.

- Identifies state and federal government agencies primarily concerned with environmental management or control.
- Identifies non-government groups primarily concerned with environmental matters.
- Describes responsibilities of state and federal agencies for environmental management or control.
- Describes the functions of non-governmental groups concerned with environmental matters.
- Identifies state or federal laws designed to protect people and the environment and discusses their effectiveness.

- Volunteers for school beautification projects.
- Lists a number of environmental factors which may affect the emotional or physical health of human beings.
- Discusses attitudes which contribute towards living in harmony with the enviornment.
- Cites examples of negative and positive ways human beings can change the environment.
- Identifies and describes environmental factors which influence the beliefs of different cultures.
- Identifies specific contributions one can make to help human beings live in harmony with the environment.
- Describes the effects of environmental changes on the beauty of the environment.
- Explains how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.
- Predicts the effects of continuing environmental changes on the beauty of environment.
- Compares the aesthetic value of maintaining natural environments with the need for housing, improved transportation facilities, and increased employment opportunities.

Grade 8 (Cont'd)

- Investigates community or state beautification projects and encourages class participation.
- Suggests ways the environment may be improved to promote better emotional and physical health for human beings.
- Accepts leadership role in school beautification projects.

Grade 10

- Cites examples of social, political, or economic decisions which have caused environmental problems.
- Describes the interrelationships of the social, political, and economic structures and environments of different societies.
- Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.
- Predicts the effects social, political, and economic changes would have on the environment.
- Selects an environmental problem, investigates alternate solutions to that problem, selects one alternative and defends that selection by identifying the benefits and consequences of that decision to the environment and to society.

- Describes instruments or methods that can be used to gain information about environments or change an environment for a desired result.
- Uses a variety of instruments or methods to study or change environments.
- Synthesizes environmental knowledge to suggest new instruments or methods which may reasonably be developed to study or change an environment.
- Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.
- Demonstrates an interest in the environment by seeking knowledge about the environment through voluntary attendance at environmental lectures, selecting elective classes in environmental studies, or by joining organizations concerned with environmental matters.
- Explains the effects of environmental changes on recreational opportunities.
- Explains the potential effects of changes in recreational activity on the environment.
- Suggests ways the environment may be improved to provide more recreational opportunities.

- Describes the impact of various industries on the environment.
- Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries' impact on the environment.

Grade 10 (Cont'd)

- Describes the types of training necessary for various occupations dealing with the environment.

- Describes responsibilities of state and federal agencies for environmental management or control.
- Describes the functions of non-governmental groups concerned with environmental matters.
- Identifies federal or state laws designed to protect people and the environment and discusses their effectiveness.
- Identifies worldwide organizations concerned with environmental matters.

- Cites examples of negative and positive ways human beings can change the environment.
- Identifies and describes environmental factors which influence the beliefs of different cultures.
- Identifies specific contributions one can make to help human beings live in harmony with the environment.
- Describes the effects of environmental changes on the beauty of an environment.
- Explains how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.
- Predicts the effects of continuing environmental changes on the beauty of the environment.
- Compares the aesthetic value of maintaining natural environments with the need for housing, improved transportation, and increased employment opportunities.
- Investigates community or state beautification projects and encourages class participation.
- Describes ways human-made environments can be designed to harmonize with natural environments.
- Suggests ways that the environment may be improved to promote better emotional and physical health for human beings.
- Evaluates the effects of community or state beautification projects.
- Makes improvement in home, school, or community environments to promote better emotional and physical health.

Grade 12

- Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.
- Predicts the effects social, political, and economic changes could have on the environment.

Grade 12 (Cont'd)

- Selects an environmental problem, investigates alternate solutions to that problem, selects one alternative, and defends that selection by identifying the benefits of that decision to the environment and to society.
- Demonstrates concern about the environment by attending lectures, taking classes outside of the regular school program, writing articles for various publications on environmental matters or by joining an ecology group.
- Organizes a special interest group to work towards solving an environmental problem.

- Uses a variety of instruments or methods to study or to change environments.
- Synthesizes environmental knowledge to suggest new instruments or methods which may reasonably be developed to study or change an environment.
- Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.
- Demonstrates an interest in the environment by seeking knowledge about the environment through voluntary attendance of environmental lectures, selecting elective classes in environmental studies or by joining organizations concerned with environmental matters.

- Suggests ways the environment may be improved to provide more recreational opportunities.

- Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries' impact on the environment.
- Describes the types of training necessary for various occupations dealing with the environment.
- Predicts occupations which may be created or abolished due to emerging environmental concerns.

- Identifies federal or state laws designed to protect people and the environment and discusses their effectiveness.
- Identifies worldwide organizations concerned with environmental matters.
- Describes the functions of worldwide organizations concerned with environmental matters.
- Analyzes the influences of various groups, individuals, and governmental organizations in making decisions on environmental matters.

- Predicts the effects of continuing environmental changes on the beauty of the environment.
- Compares the aesthetic value of maintaining natural environments with the need for housing, improved transportation, and increased employment opportunities.

Grade 12 (Cont'd)

- Investigates community or state beautification projects and encourages class participation.
- Describes ways human-made environments can be designed to harmonize with natural environments.
- Suggests ways the environment may be improved to promote better emotional and physical health for human beings.
- Evaluates the effects of community or state beautification projects.
- Makes improvement in home, school, or community environments to promote better emotional and physical health.
- Participates in school or community campaigns to provide an environment which promotes better emotional and physical health.

Performance Expectations and Foundation Program Objectives

The Environmental Education Program is a major contributor toward student attainment of five of the eight Foundation Program Objectives---III, V, VI, VII, and VIII. On the following pages these five objectives have been matched with the Environmental Education Performance Expectations which are most closely related to them.

In delineating certain Foundation Program Objectives for major emphasis in Environmental Education the reader should be aware that this does not mean that Environmental Education makes no contribution toward student attainment of the other objectives but that the program's major contribution are to the selected objectives.

Performance Expectation - Foundation Program Objective Match

Foundation Program Objective III

Develop decision-making and problem-solving skills.

Performance Expectations

Grade 3

- o Cites examples of local environmental problems.
- o Identifies causes of local environmental problems.
- o Cites examples of statewide, nationwide or worldwide environmental problems.
- o Identifies a variety of resources that may be used to gain information on environmental matters.
- o Uses a variety of resources to gain information on environmental matters.
- o Conducts simple investigations to gain first-hand information on environmental matters.

Grade 6

- o Identifies causes of local environmental problems.
- o Cites examples of statewide, nationwide or worldwide environmental problems.
- o Cites examples of social, political, or economic decisions which have caused environmental problems.
- o Identifies a variety of resources that may be used to gain information on environmental matters.
- o Uses a variety of resources to gain information on environmental matters.
- o Conducts simple investigations to gain first-hand information on environmental matters.
- o Identifies instruments or methods that can be used to gain information about environments or to change an environment for a desired result.

Grade 8

- o Cites examples of statewide, nationwide or worldwide environmental problems.
- o Cites examples of social, political, or economic decisions which have caused environmental problems.
- o Describes the interrelationship of the social, political, and economic structures and environments of different societies.
- o Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.
- o Predicts the effects social, political, and economic changes would have on the environment.
- o Uses a variety of resources to gain information on environmental matters.
- o Conducts simple investigations to gain first-hand information on environmental matters.
- o Describes instruments or methods that can be used to gain information about environments or change an environment for a desired result.
- o Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.

Grade 10

- o Cites examples of social, political, or economic decisions which have caused environmental problems.
- o Describes the interrelationships of the social, political, and economic structures and environments of different societies.
- o Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.
- o Predicts the effects social, political, and economic changes would have on the environment.
- o Selects an environmental problem, investigates alternate solutions to that problem, selects one alternative and defends that selection by indentifying the benefits and consequences of that decision to the environment and to society.
- o Demonstrates an interest in the environment by seeking knowledge about the environment through voluntary attendance at environmental lectures, selecting elective classes in environmental studies, or by joining organizations concerned with environmental matters.
- o Describes instruments or methods that can be used to gain information about environments or change an environment for a desired result.
- o Uses a variety of instruments or methods to study or change environments.
- o Synthesizes environmental knowledge to suggest new instruments or methods which may reasonably be developed to study or change an environment.
- o Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.

Grade 12

- o Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.
- o Predicts the effects social, political, and economic changes could have on the environment.
- o Selects an environmental problem, investigates alternate solutions to that problem, selects one alternative, and defends that selection by identifying the benefits of that decision to the environment and to society.
- o Demonstrates concern about the environment by attending lectures, taking classes outside of the regular school program, writing articles for various publications on environmental matters or by joining an ecology group.
- o Organizes a special interest group to work towards solving an environmental problem.

Foundation Program Objective V

Develop physical and emotional health.

Performance Expectations

Grade 3

- o Identifies recreational opportunities in both human-made and natural environments.
- o Describes the environmental factors which must be considered to conduct various recreational activities.
- o Lists a number of environmental factors which may affect the emotional or physical health of human beings.

Grade 6

- o Identifies recreational opportunities in both human-made and natural environments.
- o Describes the environmental factors which must be considered to conduct various recreational activities.
- o Explains the effects of environmental changes on recreational opportunities.
- o Explains the potential effects of changes in recreational activity on the environment.
- o Lists a number of environmental factors which may affect the emotional or physical health of human beings.
- o Explain how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.

Grade 8

- o Describes the environmental factors which must be considered to conduct various recreational activities.
- o Explains the effects of environmental changes on recreational opportunities.
- o Explains the potential effects of changes in recreational activity on the environment.
- o Suggests ways the environment may be improved to provide more recreational opportunities.
- o Lists a number of environmental factors which may affect the emotional or physical health of human beings.
- o Explains how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.
- o Suggests ways the environment may be improved to promote better emotional and physical health for human beings.

Grade 10

- o Explains the effects of environmental changes on recreational opportunities.
- o Explains the potential effects of changes in recreational activity on the environment.
- o Suggests ways the environment may be improved to provide more recreational opportunities.
- o Explains how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.
- o Suggests ways that the environment may be improved to promote better emotional and physical health for human beings.
- o Makes improvement in home, school or community environments to promote better emotional and physical health.

Grade 12

- o Suggests ways the environment may be improved to provide more recreational opportunities.
- o Suggests ways the environment may be improved to promote better emotional and physical health for human beings.
- o Make improvements in home, school, or community environments to promote better emotional and physical health.
- o Participates in school or community campaigns to provide an environment which promotes better emotional and physical health.

Foundation Program Objective VI

Recognize and pursue career development as an integral part of personal growth and development.

Performance Expectations

Grade 3

- o Names occupations in the community that are directly dependent on various natural resources.
- o Describes the natural resources needed by various industries and relates the locations of those industries to available resources.
- o Cites examples of occupations that are primarily concerned with the study or control of specific environments.

Grade 6

- o Names industries that are directly dependent on natural resources.
- o Describes the natural resources needed by various industries and relates the locations of those industries to available resources.
- o Cites examples of occupations that are primarily concerned with the study or control of specific environments.
- o Describes the impact of various industries on the environment.

Grade 8

- o Describes the natural resources needed by various industries and relates the locations of those industries to available resources.
- o Cites examples of occupations that are primarily concerned with the study or control of specific environments.
- o Describes the impact of various industries on the environment.
- o Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries' impact on the environment.

Grade 10

- o Describes the impact of various industries on the environment.
- o Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries' impact on the environment.
- o Describes the types of training necessary for various occupations dealing with the environment.

Grade 12

- o Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries impact on the environment.
- o Describes the types of training necessary for various occupations dealing with the environment.
- o Predicts occupations which may be created or abolished due to emerging environmental concerns.

Foundation Program Objective VII

Develop a continually growing philosophy that reflects responsiblity to self as well as to others.

Performance Expectations

Grade 3

- o States school or home rules designed to protect the environment.
- o Discusses the effectiveness of school or home rules designed to protect the environment.
- o Explains the need for rules to protect the environment.
- o Discusses attitudes which contribute toward living in harmony with the environment.

Grade 6

- o Discusses the effectiveness of school or home rules designed to protect the environment.
- o Explains the need for rules to protect the environment.
- o Identifies state and federal government agencies primarily concerned with environmental management or control.
- o Identifies non-governmental groups primarily concerned with the environmental matters.
- o Discusses attitudes which contribute toward living in harmony with the environment.
- o Cites examples of negative and positive ways human beings can change the environment.
- o Identifies and describes environmental factors which influence the beliefs of different cultures.

- o Identifies specific contributions one can make to help human beings live in harmony with the environment.

Grade 8

- o Identifies state and federal government agencies primarily concerned with environmental management or control.
- o Identifies non-government groups primarily concerned with environmental matters.
- o Describes responsibilities of state and federal agencies for environmental management or control.
- o Describes the functions of non-governmental groups concerned with environmental matters.
- o Identifies state or federal laws designed to protect people and the environment and discusses their effectiveness.
- o Discusses attitudes which contribute towards living in harmony with the environment.
- o Cites examples of negative and positive ways human beings can change the environment.
- o Identifies and describes environmental factors which influence the beliefs of different cultures.
- o Identifies specific contributions one can make to help human beings live in harmony with the environment.

Grade 10

- o Describes responsibilities of state and federal agencies for environmental management or control.
- o Describes the functions of non-governmental groups concerned with environmental matters.
- o Identifies federal or state laws designed to protect people and the environmental and discusses their effectiveness.
- o Identifies worldwide organizations concerned with environmental matters.
- o Cites examples of negative and positive ways human beings can change the environment.
- o Identifies and describes environmental factors which influence the beliefs of different cultures.
- o Identifies specific contributions one can make to help human beings live in harmony with the environment.

Grade 12

- o Identifies federal or state laws designed to protect people and the environment and discusses their effectiveness.
- o Identifies worldwide organizations concerned with environmental matters.
- o Describes the functions of worldwide organizations concerned with environmental matters.
- o Analyzes the influences of various groups, individuals, and governmental organizations in making decisions on environmental matters.

Foundation Program Objective VIII

Develop creative potential and aesthetic sensitivity.

Performance Expectations

Grade 3

- o Communicates feelings evoked by various types of environments.
- o Describes the need for beauty of one's environment.

Grade 6

- o Communicates feelings evoked by various types of environments.
- o Describes the need for beauty in one's environment.
- o Volunteers for school beautification projects.
- o Describes the effects of environmental changes on the beauty of an environment.
- o Accepts leadership role in school beautification projects.

Grade 8

- o Volunteers for school beautification projects.
- o Describes the effects of environmental changes on the beauty of an environment.
- o Predicts the effects of continuing environmental changes on the beauty of the environment.
- o Compares the aesthetic value of maintaining natural environments with the need for housing, improved transportation, and increased employment opportunities.
- o Investigates community or state beautification projects and encourages class participation.
- o Accepts leadership role in school beautification projects.

Grade 10

- o Describes the effects of environmental changes on the beauty of an environment.
- o Predicts the effects of continuing environmental changes on the beauty of the environment.
- o Compares the aesthetic value of maintaining natural environments with the need for housing, improved transportation, and increased employment opportunities.
- o Investigates community or state beautification projects and encourages class participation.
- o Describes ways human-made environments can be designed to harmonize with natural environments.
- o Evaluates the effects of community or state beautification projects.

Grade 12

- o Predicts the effects of continuing environmental changes on the beauty of the environment.
- o Compares the aesthetic value of maintaining natural environments with the need for housing, improved transportation, and increased employment opportunities.
- o Investigates community or state beautification projects and encourages class participation.
- o Describes ways human-made environments can be designed to harmonize with natural environments.
- o Evaluates the effects of community or state beautification projects.

Performance Expectations and Essential Competencies

"Essential Competencies are those proficiencies considered to be the minimum required for becoming productive and contributing members of society."

Environmental Education experiences for students can make significant contributions toward student attainment of all the Essential Competencies. For example, many Environmental Education activities involve reading materials on environments and environmental issues and relate to Essential Competency Number I "Read and use printed materials from daily life." There are, however, certain Essential Competencies which are more directly addressed within the program. On the following pages are listed those Essential Competencies which are most closely related to Environmental Education as reflected in the Environmental Education Performance Expectations.

Performance Expectation - Essential Competency Match

Essential Competency Number 8

Reach reasoned solutions to commonly encountered problems. Reasoned solutions are those that incorporate the facts at hand, constraints on the solution, the feasibility of carrying out the solution, and the values of those affected by the solution. Commonly encountered problems include decisions about family finance, career plans, physical health, and community issues.

Performance Expectations

Grade 3

- o Cites examples of local environmental problems.
- o Identifies causes of local environmental problems.
- o Cites examples of statewide, nationwide or worldwide environmental problems.
- o Identifies a variety of resources that may be used to gain information on environmental matters.
- o Uses a variety of resources to gain information on environmental matters.
- o Conducts simple investigations to gain first-hand information on environmental matters.

Grade 6

- o Identifies causes of local environmental problems.
- o Cites examples of statewide, nationwide or worldwide environmental problems.
- o Cites examples of social, political, or economic decisions which have caused environmental problems.
- o Identifies a variety of resources that may be used to gain information on environmental matters.
- o Uses a variety of resources to gain information on environmental matters.
- o Conducts simple investigations to gain first-hand information on environmental matters.
- o Identifies instruments or methods that can be used to gain information about environments or to change an environment for a desired result.

Grade 8

- o Cites examples of statewide, nationwide or worldwide environmental problems.
- o Cites examples of social, political, or economic decisions which have caused environmental problems.
- o Describes the interrelationship of the social, political, and economic structures and environments of different societies.
- o Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.
- o Predicts the effects social, political, and economic changes would have on the environment.

- o Uses a variety of resources to gain information on environmental matters.
- o Conducts simple investigations to gain first-hand information on environmental matters.
- o Describes instruments or methods that can be used to gain information about environments or change an environment for a desired result.
- o Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.

Grade 10

- o Cites examples of social, political, or economic decisions which have caused environmental problems.
- o Describes the interrelationships of the social, political, and economic structures and environments of different societies.
- o Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.
- o Predicts the effects social, political, and economic changes would have on the environment.
- o Selects an environmental problem, investigates alternate solutions to that problem, selects one alternative and defends that selection by identifying the benefits and consequences of that decision to the environment and to society.
- o Describes instruments or methods that can be used to gain information about environments or change an environment for a desired result.
- o Uses a variety of instruments or methods to study or change environments.
- o Synthesizes environmental knowledge to suggest new instruments or methods which may reasonably be developed to study or change an environment.
- o Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.
- o Demonstrates an interest in the environment by seeking knowledge about the environment through voluntary attendance at environmental lectures, selecting elective classes in environmental studies, or by joining organizations concerned with environmental matters.

Grade 12

- o Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.
- o Predicts the effects social, political, and economic changes could have on the environment.
- o Selects an environmental problem, investigates alternate solutions to that problem, selects one alternative, and defends that selection by identifying the benefits of that decision to the environment and to society.
- o Demonstrates concern about the environment by attending lectures, taking classes outside of the regular school program, writing articles for various publications on environmental matters or by joining an ecology group.
- o Organizes a special interest group to work towards solving an environmental problem.

- o Uses a variety of instruments of methods to study or to change environments.
- o Synthesizes environmental knowledge to suggest new instruments or methods which may reasonably be developed to study or change an environment.
- o Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.
- o Demonstrates an interest in the environment by seeking knowledge about the environment through voluntary attendance of environmental lectures, selecting elective classes in environmental studies or by joining organizations concerned with environmental matters.

Essential Competency Number 9

Distinguish fact from opinion in TV and radio news broadcasts, advertising, newspaper and magazine articles, and public speeches.

Performance Expectations

Grade 3

- o Identifies a variety of resources that may be used to gain information on environmental matters.
- o Uses a variety of resources to gain information on environmental matters.

Grade 6

- o Identifies a variety of resources that may be used to gain information on environmental matters.
- o Uses a variety of resources to gain information on environmental matters.

Grade 8

- o Uses a variety of resources to gain information on environmental matters.
- o Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.

Grade 10

- o Synthesizes environmental knowledge to suggest new instruments or methods which may reasonably be developed to study or change an environment.
- o Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.

Grade 12

- o Synthesizes environmental knowledge to suggest new instruments or methods which may reasonably be developed to study or change an environment.
- o Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.

Essential Competency Number 10

Use resources for independent learning. These resources include the library, informed persons, and public and private agencies.

Performance Expectations

Grade 3

- o Identifies a variety of resources that may be used to gain information on environmental matters.
- o Uses a variety of resources to gain information on environmental matters.
- o Conducts simple investigations to gain first-hand information on environmental matters.

Grade 6

- o Identifies a variety of resources that may be used to gain information on environmental matters.
- o Uses a variety of resources of gain information on environmental matters.
- o Conducts simple investigations to gain first-hand information on environmental matters.
- o Identifies instruments or methods that can be used to gain information about environments or to change an environment for a desired result.

Grade 8

- o Uses a variety of resources to gain information on environmental matters.
- o Conducts simple investigations to gain first-hand information on environmental matters.
- o Describes instruments or methods that can be used to gain information about environments or change an environment for a desired result.
- o Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.

Grade 10

- o Describes instruments or methods that can be used to gain information about environments or change an environment for a desired result.
- o Uses a variety of instruments or methods to study or change environments.
- o Synthesizes environmental knowledge to suggest new instruments or methods which may reasonably be developed to study or change an environment.
- o Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.

Grade 12

- o Uses a variety of instruments or methods to study or to change environments.
- o Synthesizes environmental knowledge to suggest new instruments or methods which may reasonably be developed to study or change an environment.
- o Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.
- o Demonstrates an interest in the environment by seeking knowledge about the environment through voluntary attendance of environmental lectures, selecting elective classes in environmental studies or by joining organizations concerned with environmental matters.

Essential Competency Number 11

Identify the harmful effects of smoking, drinking, drug abuse, overeating, insufficient sleep, poor personal hygiene, and poor nutrition.

Performance Expectations

Grade 3

- o Lists a number of environmental factors which may affect the emotional or physical health of human beings.

Grade 6

- o Lists a number of environmental factors which may affect the emotional or physical health of human beings.
- o Explains how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.

Grade 8

- o Lists a number of environmental factors which may affect the emotional or physical health of human beings.
- o Explains how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.

Grade 10

- o Explains how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.
- o Suggests ways that the environment may be improved to promote better emotional and physical health for human beings.
- o Makes improvement in home, school, or community environments to promote better emotional and physical health.

Grade 12

- o Suggests ways the environment may be improved to promote better emotional and physical health for human beings.
- o Makes improvement in home, school, or community environments to promote better emotional and physical health.
- o Participates in school or community campaigns to provide an environment which promotes better emotional and physical health.

Essential Competency Number 12

Identify the training, skill and background requirements of at least one occupation in which the student is interested.

Performance Expectations

Grade 3

- o Names occupations in the community that are directly dependent on various natural resources.
- o Describes the natural resources needed by various industries and relates the locations of those industries to available resources.
- o Cites examples of occupations that are primarily concerned with the study or control of specific environments.

Grade 6

- o Names industries that are directly dependent on natural resources.
- o Describes the natural resources needed by various industries and relates the locations of those industries to available resources.
- o Cites examples of occupations that are primarily concerned with the study or control of specific environments.
- o Describes the impact of various industries on the environment.

Grade 8

- o Describes the natural resources needed by various industries and relates the locations of those industries to available resources.
- o Cites examples of occupations that are primarily concerned with the study or control of specific environments.
- o Describes the impact of various industries on the environment.
- o Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries' impact on the environment.

Grade 10

- o Describes the impact of various industries on the environment.
- o Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries' impact on the environment.

- o Describes the types of training necessary for various occupations dealing with the environment.

Grade 12

- o Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries' impact on the environment.
- o Describes the types of training necessary for various occupations dealing with the environment.
- o Predicts occupations which may be created or abolished due to emerging environmental concerns.

Essential Competency Number 13

Demonstrate knowledge of the basic structure and functions of national, state and local governments.

Performance Expectations

Grade 3

None

Grade 6

- o Identifies state and federal government agencies primarily concerned with environmental management or control.

Grade 8

- o Identifies state and federal government agencies primarily concerned with environmental management or control.
- o Describes responsibilities of state and federal agencies for environmental management or control.

Grade 10

- o Describes responsibilities of state and federal agencies for environmental management or control.

Grade 12

None

Essential Competency Number 15

Demonstrate knowledge of important citizen rights and responsibilities. This includes the rights guaranteed by the Constitution and knowledge of traffic laws and major criminal offenses.

Performance Expectations

Grade 3

- o States school or home rules designed to protect the environment.
- o Discusses the effectiveness of school or home rules designed to protect the environment.
- o Explains the need for rules to protect the environment.
- o Discusses attitudes which contribute toward living in harmony with the environment.

Grade 6

- o Discusses the effectiveness of school or home rules designed to protect the environment.
- o Explains the need for rules to protect the environment.
- o Discusses attitudes which contribute toward living in harmony with the environment.
- o Cites examples of negative and positive ways human beings can change the environment.
- o Identifies specific contributions one can make to help human beings live in harmony with the environment.

Grade 8

- o Identifies state or federal laws designed to protect people and the environment and discusses their effectiveness.
- o Discusses attitudes which contribute towards living in harmony with the environment.
- o Cites examples of negative and positive ways human beings can change the environment.
- o Identifies specific contributions one can make to help human beings live in harmony with the environment.

Grade 10

- o Identifies federal or state laws designed to protect people and the environment and discusses their effectiveness.
- o Cites examples of negative and positive ways human beings can change the environment.
- o Identifies specific contributions one can make to help human beings live in harmony with the environment.

Grade 12

- o Identifies federal or state laws designed to protect people and the environment and discusses their effectiveness.

Environmental Education Activities

To help students achieve the goal and objectives of the Environmental Education Program, teachers and administrators should provide students with a wide variety of activities. The characteristics of these activities are described below.

1. Activities should be interdisciplinary integrating subject and thematic areas to develop environmental education concepts and issues.

2. Activities should aim at increasing the learner's interest in, awareness of, and sensitivity toward the environment.

3. Activities should aim at developing the learner's understanding of human effects on the environment and environmental effects on humans.

4. Activities should aim at helping the learner to become knowledgeable about both natural and human-made environments and associated problems--social, economic, political.

5. Activities should be student-centered, problem-oriented, process-oriented, and community-oriented.

6. Activities should aim at helping the learner to recognize and clarify personal values that relate to the environment and to act in a positive manner on environmental matters.

7. Activities should utilize a variety of resources.

8. Activities should include many direct experiences with a variety of environments.

9. Activities should be aimed at developing environmental concepts and issues in the context of a gradually widening horizon beginning with the local environment and expanding through statewide, nationwide and worldwide environments to the extraterrestrial environment.

* Development of skills and concepts from individual areas should not be ignored or neglected but should also become a regular part of environmental education activities. Consult the appropriate program or curriculum guide for further information (See pages E41 - E46 in the Appendix).

Decision Making/Problem Solving Investigations

Since a major portion of environmental education is devoted to helping humans make the necessary decisions and solve the problems related to maintenance of environmental quality, the decision-making and problem solving process cannot be overemphasized. Investigations which promote this process should represent a major portion of Environmental Education activities. The following is a description of such investigations.

1. Interdisciplinary, encouraging students to integrate learning from many disciplines in the resolution of problems;

2. Activity and process-centered, requiring students to practice and apply processes such as:

    a. Observing, measuring, classifying
    b. Collecting, organizing, recording, interpreting data
    c. Inferring, predicting, hypothesizing
    d. Communicating
    e. Valuing
    f. Seeking alternatives
    g. Defining the problem
    h. Acknowledging constraints

Decision making/problem solving investigations may be used to promote the acquisition of knowledge and insight into such environmentally significant areas:

a. Human Populations
b. Resource Use and Depletion
c. Pollution
d. Environmental Management and Control
e. Environmental Ethics
f. Public Concern
g. Ecological Integrity
h. Employment and Environmental Quality

Such investigations permit reconciliation of a variety of value-based positions on environmental alternatives through student interactions, exchange of ideas, and exploration and culminate in a consensus position of the total group of students regarding any issue, such as is required in real life. More important, such investigations allow students to tackle problems that are meaningful to <u>them</u>, <u>now</u>, at their maturity level, and allow them to practice and learn individual and group problem-solving skills which can in turn be applied to other problems and concerns they meet <u>now</u> and in the <u>future</u>.

Values Clarification

Values clarification is an important part of an effective environmental education program. To comprehend the role of valuing in environmental education, it is important to realize that real understanding and ultimate resolution of environmental problems and issues demand more than the superficial efforts, or symptomatic activities found in some environmental education programs. In order to solve environmental problems, it is essential to get at the underlying causes--individual and group lifestyles. Picking up litter would be treating the symptom. Developing the individual's or group's desire to change the behavioral patterns that cause people to drop the litter would focus on the underlying cause of the problem.

In everyday life, one encounters both visible and non-visible effects produced by technology in its effort to create and satisfy consumer demands. Because it is easy to get caught up in consumer cycles stimulated through advertising, each student needs to examine the individual's way of living. Each student needs to be guided through a valuing process where he or she explores the consequences of one's individual action, and collective group action, learning to generate ideas for alternative behaviors that would bring the individual or group into a more harmonious way of living with the environment.

A student begins to develop a set of values when he or she starts to consider alternatives, the consequences of alternatives, and his or her personal feelings toward each alternative before he or she acts. The steps advocated in the values clarification process are:

1. Students are presented with a problem or issue.
2. Students analyze the problem or issue.
3. Students generate and examine alternative solutions.
4. Students consider the consequences of each alternative to the environment and society.
5. Students express and analyze their feelings and thoughts about each alternative.
6. Students make an intelligently examined, socially responsible free choice.

Values clarification helps students become aware of personal and group beliefs, attitudes, values, and behaviors which they prize and are committed to both in and out of the classroom. This process assists students in considering alternative solutions and the implications of each alternative. A critical role of the teacher is to help each student to consider whether the person's stated beliefs, attitudes and values are congruent with her or his actions.

Values clarification and analysis are of major importance in making rational environmental decisions every day of a person's life, and must be a basic part of every environmental education program. Knowing one's values and the values of the society in which one functions also help an individual to build a more positive self-concept.

Communication in Environmental Education

Environmental education provides many opportunities for students to develop their communicative skills and knowledge. Environmental education activities should be designed "to assist students to develop the highest level of control possible over their use of language"*. Students will use reading and listening to gain understanding of environments and environmental matters and speaking and writing to provide information and to explore and promote ideas related to environments and environmental matters.

*Goal--Language Arts Program Guide, K-12 Office of Instructional Services, General Education Branch Department of Education, State of Hawaii RS 79-7609

Environmental Education Team

Environmental education consists of a wide variety of formal and non-formal educational experiences and processes which enable humans to develop awareness and understanding of the environment, skills in dealing with environmental problems, and positive attitudes which will help them to live in harmony with the environment. No individual could possibly provide students with the variety of experiences necessary for them to achieve the goal and objectives of the Environmental Education Program; however, a group consisting of state, district, and school personnel, community and governmental representatives, parents and students could provide these educational experiences. In order to be effective in promoting the program goal and objectives, the group of people contributing to the program must be a team in the truest sense of the word. Cooperation between team members and a genuine belief in the program goal and objectives by each member must characterize this group to provide the esprit de corps which will benefit the program.

The Teacher

The most important element in the delivery of the Environmental Education Program is the teacher. Success of the program depends upon the teacher's understanding of the nature of Environmental Education and his/her commitment to the goal and objectives of the Department's Environmental Education Program. Every teacher has the capacity and the opportunity to make a major contribution to the program.

Since Environmental Education is an interdisciplinary area, elementary teachers who must teach many different subjects can utilize Environmental Education as a way of integrating the subjects to provide a more relevant program for students. For secondary teachers who wish to broaden their students' viewpoints of the subject matter in their specialized area and to help them understand how the subject relates to the larger world, Environmental Education provides an excellent means for promoting this enlarged viewpoint. Environmental Education also provides a means for organizing team teaching activities. This is especially true at the secondary level where a team of several teachers with various specialized backgrounds can plan activities which integrate these specialties into a total picture of environmental matters for students.

Whether Environmental Education is presented by one teacher within a variety of subjects or by a team of teachers from various specialized subjects is not the important point. To present an effective Environmental Education Program, the elements from many subject areas must be drawn together and integrated to present a total picture of the environment and humans' relation to the environment.

To be effective in program delivery, all teachers should:

1. Understand the objectives of public education in the United States.
2. Know the Hawaii's Educational Master Plan Purposes and Foundation Program Objectives and understand their application to the Environmental Education Program.
3. Understand children and the learning process.
4. Know and practice effective teaching techniques.
5. Have the ability to communicate clearly and precisely.
6. Be receptive to new ideas and opinions different from their own.
7. Understand the concept of environment, components of the environment, interactions in the environment, and forces causing these interactions.
8. Understand and believe in the goal and objectives of the program.
9. Have the desire to instill the goal and objectives in their students.

Chapter III

CONTENT OF THE INSTRUCTIONAL PROGRAM

Concepts

Environmental Education is a thematic program, therefore Environmental Education concepts are developed through the content and learning activities of the range of programs in the Department. On the following pages is a description of the concepts to be developed in the Environmental Education Program and a chart identifying the concepts which each subject area helps to develop.

Concepts that are included tend to endure and possess a high degree of generalizability and universality.

The propelling need for environmental education results from the impact of technology on our ecology. Environmental Education is a human creation and must be viewed from the human vantage point. Human beings transcend the rest of the animal kingdom and may be legitimately considered as an organism apart, because of the multitude of environments which they can enter either directly or indirectly through the control of artifacts or through the outreach of imagination. It is these environments that constitute the categories from which the content of environmental education is drawn. There are five categories--personal, social-intellectual, terrestrial, extraterrestrial, and total human environment. Examples of concepts associated with the categories are listed below.

- Personal Environment. The personal environment of humans encompasses both mind and body and the processes and interactions thereof. It is studied in human physiology and psychology. It creates immediate experience and expands to encompass personal knowledge, skills, and the regulators of personal action, conscience and ethical commitment.

  1. I am a human and I am responsible for my:

     a. survival.

     b. personal power.

     c. consequence of actions.

     d. knowledge, skill, attitudes.

     e. sense of personal worth.

  2. I am an actor and I am capable of:

     a. action or inaction.

     b. changing things over time.

     c. enhancing personal survival probability.

     d. consuming resources.

     e. intentional or unintentional action.

f. knowing.

g. judging quality.

h. generating knowledge.

3. I am a social creature and have an ethical responsibility for:

a. the quality of our common environment.

b. institutional structures which bear on the environment.

c. the artifacts that interact with the environment.

d. educating others about the environment.

e. my interdependence with others.

- Social-Intellectual Environment. The social-intellectual environment encompasses the substance and structures of relationships, both physical and intellectual, between humans. It is studied in sociology, economics, political sciences, law, aesthetics, cultural studies, literature, religion, etc. It is the set of institutions that bind human interaction and regulate human involvement with all other environments.

1. Social and intellectual agencies are human creations and as such should:

a. be subject to continuous re-evaluation.

b. promote human survival and increase the common quality of life.

c. provide for responsible management of that part of the earth's environment within their control.

2. Social and intellectual agencies should generate:

a. social, physical and biological knowledge that interprets and contributes to the creation of optimum present and future environments.

1. Humans should continue to pursue the knowledge of social, physical, and biological principles to insure greater understanding of environments.

2. Humans should continue to pursue knowledge on how to regulate their technology so that it operates to optimize ecological quality.

3. Humans should educate their young in the history of their struggle to improve their quality of life so that lessons of the past are not lost.

4. Humans should attempt to apply their knowledge of social, physical, biological principles to enhance their chances of survival and to maximize the quality of life.

b. guides for interpersonal action.

1. These guides should account for the fact that individuals make different demands of their environment in accordance with their perceptions.

2. These guides should account for the fact that individuals have the potential to deal successfully with their environments according to the degree of intellectual growth they have attained.

3. These guides should allow individuals freedom to act within their own environment.

c. procedures to resolve conflicting demands on the environment between individuals and groups.

d. procedures for planning the optimum use of the environment by individuals and groups to improve the common quality of life.

e. inducements to share equitably the costs and benefits of human use of the environment.

- Terrestrial Environments. Terrestrial environments encompass the biotic and abiotic components including the atmosphere, litrosphere, and hydrosphere; biological components of plants and animals; and artifacts which are the creation of humans. There are cause and effect interactions between all components. These environments are studied in biology, chemistry, physics, geology, meteorology, oceanography, ecology, engineering, etc. This is the set of environments most often identified with Environmental Education.

1. There is a constant interaction between the biological and physical entities of the earth's environment.

a. The biological and physical resources of earth are limited.

b. There are ecological limits to the biological carrying capacity of the earth.

c. Renewable resources of the earth are primarily solar and biological.

d. The matter of the earth can be transformed and recycled.

e. The earth's principal energy source is the sun which drives most of the interaction between biological and physical entities.

f. There are delicate balances in the character of the atmosphere, the earth's magnetic field, and other physical features of the earth that are essential to biological survival.

g. Biological survival depends on quantitative and qualitative factors of the environment.

h. The earth's environments have been and continue to be in a constant process of change.

2. Humans interact both directly and indirectly through artifacts with biological and physical entities of their environment.

   a. Humans are animals and are subject to the natural laws that govern all animals.

   b. Artifacts are only partially controllable by humans.

   c. Humans can manage some biological and physical entities but such management is limited.

   d. Humans appear unique in their ability to develop extensive symbolic communication systems; to adapt to a vast variety of ecological niches; to produce artifacts which satisfy practical and aesthetic needs; to plan and create futures and reconstruct the past; to create technological devices and systems; and to create engines of self-destruction.

   e. Human survival depends on quantitative and qualitative factors of the environment.

   f. The rate of change within the earth's environment is accelerating through human activity.

   g. Humans adapt to new environments, in part, through social change, but to ensure survival, there needs to be a better balance between social change and technology.

   h. Solutions to problems may be achieved through social and/or technological change, but some combinations can create more problems than they solve.

   i. Humans through their technology are more rapacious consumers of resources than any other organism.

   j. Humans respond to the aesthetic qualities of environments as well as to their utilization qualities.

- Extraterrestrial Environments. Extraterrestrial environments encompass all that is outside the earth, including the void of space, the solids and fluids of heavenly objects, any possible biological entities, the artifacts of humans--landers, capsules, space traveling humans and others. These are studied in chemistry, physics, geology, meteorology, astronomy, biology, and engineering. These environments interact with all terrestrial environments through partial bombardment and the energies of the electromagnetic spectrum and gravitation. These are frontier environments.

  1. There is an interaction between the biological and physical entities of the earth and the gravitational energy sources of the universe.

  2. All the entities of the universe appear to interact in parallel to the workings of the microscopic, Earth, and on our solar system and universe.

  3. Of all earth's creatures, only humans have the capacity to reach beyond the confines of the earth at their own will.

a. Humans through their artifacts and personal venturing have the potential for affecting parts of the solar system and the reaches beyond.

b. The nature of the extraterrestrial environments is unknown in most of its dimensions and, therefore, a frontier to human interest.

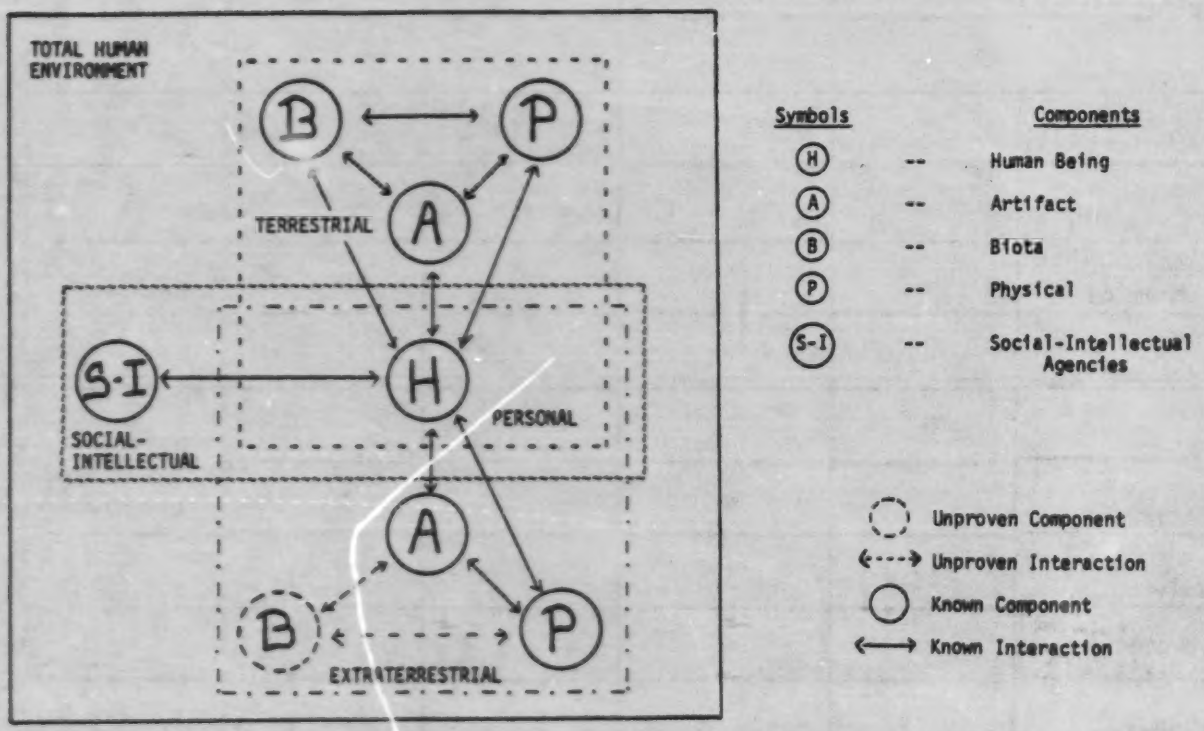
c. Space activities have given humans a new perception of their place in the universe, a sense of unity as earth beings and the finiteness of global earth.

- Total Human Environment. The total human environment encompasses all the environments and their complete set of interactions. It is studied in totality in Environmental Education, as cosmology and metaphysics and in part through all other disciplines.

  The totality of interactions of all environments constitute our total human environment.

  Below is a diagram summarizing the five categories of environments, the components that interact in those environments, and the interactions between those components.

THE FIVE CATEGORIES OF HUMAN ENVIRONMENTS



Development of Concepts by Subject and Thematic Areas

Environments

Subject Areas	Personal	Social-Intellectual	Terrestrial	Extra-Terrestrial	Total Human
Math (M)			X	X	X
Physical Education (PE)	X	X	X		X
Science (Sc)	X	X	X	X	X
Health (H)	X	X			X
Social Studies (SS)	X	X	X		X
Art		X			X
Music		X			X
Language Arts (LA)		X			X
Basic Practical Arts (BPA)	X				X
Asian, European & Pacific Languages (AEP)		X	X		X
Agriculture (Ag)			X		X
Industrial Technical (IT)			X		X
Industrial Arts (IA)			X		X
Home Economics (HEc)	X	X			X
Business (Bus)	X	X			X
Guidance	X	X	X		X
Career	X	X			X
Values	X	X			X
Student Activities (Student Act)		X			X
Library					X
Nutrition	X		X		X
Hawaiian Studies	X	X	X		X

Environmental Areas of Concern

Below is a list of major environmental areas of concern. These areas are interrelated; none can stand alone as a separate entity. It is from these interrelated areas that commanding environmental issues and problems are constantly emerging. These issues and problems are normally immediate and pressing and threatening to survival or quality of life.

1. Human Populations - particularly the impact on global resources and the quality of human interactions.

2. Resource Depletion - most important the consumption of non-renewable resources.

3. Pollution - the toxic substances and noxious wastes, noise and thermal conditions that diminish environmental quality and/or life expectancy.

4. Management and Control - the problems of human governance of global problems associated with degradation of the environment.

5. Environmental Ethic - the development of global set of principles and practices to guide optimum interaction with the environment.

6. Public Concern - in most democratic societies there is an ever increasing need for citizen awareness and participation in the processes of environmental management and decision making.

7. Ecological Integrity - the preserving of the ecological system of the world in a condition necessary to optimize quality of global life.

8. Employment and Environmental Quality - the maintenance of a quality environment while providing full employment opportunities.

The issues and problems that emerge from these areas of concern may range in scale from highly localized (home, classroom, community) to statewide, nationwide, global, or even extraterrestrial. This variation in scale enables students to address environmental issues and problems within the grasps of their abilities and experiences and facilitates extension of students' experiences into new realms of learning.

In order for students to utilize the concepts to address the problems and issues emerging from the environmental areas of concern, a series of six instructional goals, each with its own set of attendant instructional objectives, have been developed (See Chapter IV).

The list of instructional objectives for each goal should not be considered exhaustive; numerous possibilities exist for generation of instructional objectives which lead to student attainment of each instructional goal. School and district personnel may wish to revise or add instructional objectives to better meet the particular needs to their students.

Instructional Goals

A. Students will support and practice wise utilization of traditional sources of energy and also support research and development of alternate energy sources.

B. When faced with decisions concerning the use of terrestrial and extraterrestrial resources, students will select practices developed in recognition of present and future environmental and human needs.

C. Students will voluntarily participate in programs involving resource reclamation.

D. Students will demonstrate their awareness and knowledge of population processes and dynamics.

E. Students will demonstrate an appreciation for the interdependence of living things in the closed earth system.

F. Students will examine optional courses of action and their consequences for improving the quality of life and will support those that will provide optimum short-and long-term benefits for society and the environment.

Chapter IV

INSTRUCTIONAL GOALS AND OBJECTIVES

On the following pages are a series of six instructional goals, each with its own set of attendant instructional objectives. These goals and objectives integrate the concepts and areas of concern in light of the program goal and objectives, to provide a constructive way of approaching the concepts and areas of concern in the classroom. For each instructional objective, suggested grade levels where the instructional activities are appropriate have been provided, and subject and thematic areas under which those activities fall are delineated.*

These goals and objectives should be considered as only one way of approaching the concepts and areas of concern. School and district personnel may decide to use the instructional goals and objectives provided but may consider expanding or adjusting the objectives to better meet the particular needs of their students. Any approach used should be based on material in this guide and be measureable by the Performance Expectations provided in this guide.

To use this set of objectives, planning for development of instructional objectives within the grade level blocks--K-3, 4-6, 7-9, 10-12,--and coordination between the subject and thematic areas listed for each objective must occur. The planning and coordinating process not only will help to promote student attainment of the Environmental Education Program goal and objectives but will also provide the additional spin-off of increasing the relevancy of student learning in all subject and thematic areas and grade levels by interrelating the various areas and by building a continuum along which student development in all areas is reinforced.

Abbreviations used for subject and thematic areas are as follows:

Mathematics	M
Physical Education	PE
Science	Sc
Health	H
Social Studies	SS
Language Arts	LA
Basic Practical Arts	BPA
Asian, European, and Pacific Languages	AEP
Agriculture	Ag
Industrial Technical	IT
Industrial Arts	IA
Home Economics	H Ec
Business	Bus
Student Activities	Student Act

Nutrition	N
Hawaiian Studies	HS
Career Education	C
Values Education	V
Library Skills	LS

Note: * The area of Guidance has been deliberately omitted to avoid confusion. Guidance is and should be an integral part of almost all instructional activities in this section.

INSTRUCTIONAL GOAL A:

Students will support and practice wise utilization of traditional sources of energy and also support research and development of alternate energy sources.

SUGGESTED GRADE LEVEL		INSTRUCTIONAL OBJECTIVES: Provided with the necessary experiences, data and information, students will:	SUGGESTED SUBJECT AND THEMATIC AREAS
K-3	1.	identify and/or name sources of energy which are used in daily life.	Sc, SS
K-3	2.	trace items of clothing and food back to their energy source.	Sc, H, N
K-3	3.	report to the class examples of how energy is used in the community.	Sc, LA
K-3	4.	identify examples of energy use in the school or home.	Sc, SS
4-6	5.	portray their dependence on the sun through a dramatic presentation or through oral or written report.	Sc, LA
4-6	6.	identify positive and negative effects resulting from the production of electricity from chemical, thermonuclear, geothermal, ocean thermal, bioconversion and solar energy sources.	Sc, SS, H, Art, Music, V
4-6	7.	give examples of how the availability of energy and economic growth are interrelated.	Sc, SS, C
4-6	8.	relate the increased production of energy to pollution and resource depletion.	Sc, H, SS, Art, N
4-6	9.	propose options to the internal combustion engine as a main source of power for public transportation.	Sc, SS, M
4-6	10.	compare life styles of societies having access to different energy sources.	Sc, SS, HS, C
7-9	11.	relate the increased demand for energy to population growth and changing life styles.	Sc, SS, M, HS, N
7-9	12.	list changes people can make in their own living habits which would place less demand on available energy sources.	Sc, SS, H, PE, N, V
7-9	13.	project the effect of a changing world population on future energy supplies.	Sc, SS, H, M, AEP

7-9	14.	collect data on petroleum reserves and suggest practices which would slow the depletion of these reserves.	Sc, SS, M, LS
7-9	15.	list and describe ways the community can better manage electrical energy consumption.	Sc, SS, BPA, N
7-9	16.	collect data on solid fossil fuel reserves and discuss the environmental impact of utilizing these reserves in various energy consumption modes.	Sc, SS, H, BPA, M, LS
7-9	17.	discuss the feasibility of converting the electrical energy industry to a nuclear power base and compare the merits of such a proposal with other optional basic energy sources like coal, solar power, or geothermal power.	Sc, SS, H, LA, M, C
7-9	18.	debate the resolution "The environment will continue to sustain life in a quality manner if population and harnessed energy continue to expand."	Sc, SS, H, LA, Art, Music
7-9	19.	suggest programs which will promote concern for avoiding exploitation of our energy resources.	SS, H, LA, Art, Music, V
7-9	20.	list convenience products (including packaging items) which are used daily, describe their impact on our energy reserves and identify related habits that can be developed to conserve energy.	Sc, SS, H, BPA, N, V
7-9	21.	plan and carry out activities to improve the energy management of the school.	Sc, SS, Student Act., M
7-9	22.	select a convenience product being advertised in the media and project the energy consumption which would result from mass utilization of it.	Sc, SS, M
7-9	23.	discuss how changing to battery or electric powered cars could simply be a shift from one pollution problem to another.	Sc, SS, H, LA
7-9	24.	compare the energy (calories) used in cultivating an acre of land with that produced by the crops and discuss such "tradeoffs" in terms of impact on fossil fuel reserves.	Sc, SS, H, M
7-9	25.	identify energy problems that could be serious by the year 2000 if current practices are not changed and suggest necessary changes.	Sc, SS, LS
7-9	26.	discuss how economic development practices can either enhance or disrupt the energy flow through food chains.	Sc, SS, H, N

7-9	27.	use various media to demonstrate human energy dependence on the sun.	Sc, LA, Art, Music, LS
7-9	28.	use various media to demonstrate how human desire for economic gains has affected energy resources.	Sc, LA, SS, M, C LS
7-9	29.	use various media to present evidence for the need to improve the management of our energy resources.	Sc, LA, SS, M, Art, V, Student Act, LS
10-12	30.	write an essay which compares and contrasts modern and ancient concepts of the sun.	Sc, LA, AEP, HS
10-12	31.A.	collect data on the current rate of energy consumption and predict either the zero supply date or the steady-state date for two or more sources of energy.	Sc, SS, M, LS
	B.	project the environmental impact of the utilization of various energy sources. This impact study should consider not only the effects of the waste products of the utilization process itself but the environmental degradation that results from securing, transporting and processing the energy sources for utilization, i.e., final comsumption, and the energy requirements for these processes.	Sc, SS, H, Art, Music, IT, IA, C, N
	C.	analyze human needs in terms of energy requirements (both direct and indirect;) and combine this information with that derived from the two previous objectives to suggest the best energy source to be utilized in providing for each need.	Sc, SS, H, Ec, N, V
	D.	analyze the American life style in comparison with various other life styles to propose a life style which would provide a balance in terms of energy pool and quality of life.	Sc, SS, H, Art, Music, AEP, HS, V, C, N
	E.	discuss the feasibility of discovering and developing new energy sources as others are depleted, e.g., undiscovered fossil fuel beds or improved technology for harnessing current resources.	Sc, SS, IT, IA
	F.	propose mechanisms based on the second law of thermodynamics for harnessing the enthalpy to entropy energy flow of the earth system, the solar system and/or the universe. Also: 1. evaluate the feasibility of implementing this proposal. 2. prepare a program to present the need for this proposal to the class, the community or other groups. 3. construct a working model of this proposal.	Sc, SS, H, LA, Art

10-12	32.	project how implementing an apparent solution to a pollution problem may increase the demand on the earth's energy resources.	Sc, SS, H
10-12	33.	construct the food web for two or more dietary systems of different human societies and the corresponding food pyramids to compare the effects of various diets on the world's energy pool.	Sc, H Ec, H, N, HS
10-12	34.	project the total environmental cost of different modes of transportation that could be used for moving goods and/or people and select the one or the combination of modes which will provide an optimum balance in terms of energy conservation, environmental poisoning and human convenience.	Sc, SS, H, M, IT, IA, C
10-12	35.A.	research passive and active solar heating systems for homes and buildings.	Sc, IT, IA, M, H Ec, LS
	B.	plan a Hawaiian home which would minimize impact on energy resources.	Sc, IT, IA, M, H Ec, HS, C

INSTRUCTIONAL GOAL B:

When faced with decisions concerning the use of terrestrial and extraterrestrial resources, students will select practices developed in recognition of present and future environmental and human needs.

SUGGESTED GRADE LEVEL		INSTRUCTIONAL OBJECTIVES: Provided with the necessary experiences, data and information, students will:	SUGGESTED SUBJECT AREAS
K-3	1.	describe and diagram their own community, showing where water and food is obtained and wastes (solid and liquid) are disposed.	SS, H, Sc, N
K-3	2.	list the observations made with the five senses while walking through the neighborhood, a woods, or along the beach.	SS, LA, Art Music, Sc, H
K-3	3.	distinguish between the needs and luxuries of a family by classifying pictures into these groups.	SS, LA, PE, N, V
K-3	4.	indicate which foods are shipped into Hawaii by placing an I (Imported) and/or G (Grown) by pictures of the foods or their names in a listing.	SS, LA, H, N
K-3	5.	construct a scrapbook or other device which illustrates the needs of humans - clothing, food, fuel, shelter and their plant, animal or mineral source.	SS, LA, N
K-3	6.	give examples of how needs and luxuries both use up natural resources and cause pollution.	SC, SS, N
K-3	7.	classify environmental changes from before-after pictures sets as natural or human-caused.	SS, Sc
K-3	8.	label rings on a stump or log cross-section which came into being at the same time as various events in their or their family's lives.	SS, M
K-3	9.	identify uses people make of trees or other plants (food, shade, lumber, paper, bows, arrows, furniture, etc.)	SS, Sc, PE, N, HS
K-3	10.	record by pictures or stories the appearance of a tree or bush at various times of the year and write a poem or story describing the changes observed.	LA, Art, Sc

K-3	11.	present a program dramatizing why forest or brush fires should be prevented and how to prevent them.	LA, SS, Student Act
K-3	12.	record wildlife that has been seen during a given time period noting the animal, date, time and location.	SS, Sc
K-3	13.	locate safe and unsafe drinking water supplies in the community.	Sc, SS, N
K-3	14.	describe ways the surroundings can be improved.	LA, H, SS, Art, Music, PE, Sc
K-3	15.	record for one day pleasant and unpleasant sights that are observed.	LA, H, Art, V
K-3	16.	name three pleasant and unpleasant odors and identify their source.	LA, Sc, H, Art, N
K-3	17.	identify places where there is a lack of oxygen (plastic bags, trunks, sand banks).	LA, H, Sc
K-3	18.	list words that tell about the conditions of the air and write a poem or story using these words.	LA, H
K-3	19.	list ways water is used in daily living.	LA, SS, H, N
K-3	20.	construct a rain gauge and record amount of rainfall over a given period of time.	Sc, M
K-3	21.	describe or illustrate the path of a stream that has been observed and discuss changes in its character along its path.	Sc, H, LA
K-3	22.	portray human dependence on clean water through a dramatic presentation or through an oral or written report.	LA, H, Sc, N
K-3	23.	describe or illustrate the changes in a section of the seashore that has been observed over a period of time.	Sc, H, LA, Art
K-3	24.	describe or illustrate changes in their school or community based on historical photographs or records.	SS, LA, HS
K-3	25.	describe or illustrate how land is used in this community.	Sc, SS, PE
K-3	26.	identify areas where erosion is in evidence.	Sc, SS
K-3	27.	carefully examine a cubic foot of earth, list and report findings to the class.	Sc, LA, M
K-3	28.	plant similar seeds in different kinds of soil and record the difference in their growth when given similar amounts of water and sunshine.	Sc, M

K-3	29.	plant and cultivate a flower or vegetable garden at home or school and identify ways the environment was controlled to produce desired ends.	Sc, SS
4-6	30.	rank modes of transportation according to their cost and impact on resources using modes such as wagon, airplane, foot, car, and train.	LA, SS, H, M
4-6	31.	locate resources in the neighborhood, community and county which are under-going change.	Sc, SS, H, HS, LS
4-6	32.	name resources which are used and classify those which are renewable and those upon which people are dependent for basic needs.	Sc, SS, N, H
4-6	33.	name and classify individuals upon whom we are dependent for basic needs.	Sc, SS, N, H
4-6	34.	identify problems involving soil, water, air and plant life in the community and suggest and defend possible solutions to the problems.	Sc, SS, H, N
4-6	35.	illustrate that resources such as iron, coal, water and minerals must be conserved.	Sc, SS, Art
4-6	36.	give examples which demonstrate how depletion of one resource can increase demands for another.	Sc, SS
4-6	37.	explain how the uneven distribution of natural resources affects the citizens of various countries including the United States.	SS, M, C
4-6	38.	discuss the concept that the earth is a spaceship with limited resources and has a limited capacity for recycling.	Sc, SS, H, N
4-6	39.	suggest political, social and economic reasons for proposing laws about use of natural resources.	Sc, SS, H, C
4-6	40.	develop a model to demonstrate how water can be recycled.	Sc, SS, H
4-6	41.	write an imaginative story about a drop of water's journey through the water cycle.	Sc, LA, H
4-6	42.	compute the volume of water falling on a specified area during a one-inch rainfall.	Sc, M
4-6	43.	estimate the cost of water one uses per year if water costs 77¢ per 1,000 gallons.*	M

*Price data current as of November 1, 1980. Contact Board of Water Supply for update information. See index for telephone numbers for all major islands.

4-6	44.	explain how Hawaii's climate is affected by the surrounding ocean and the mountains and discuss how climate affects human behavior.	Sc, SS, LA, HS
4-6	45.	design a dramatic production to illustrate the dependence of plants and animals upon water as a resource.	Sc, LA, N
4-6	46.	cite examples illustrating how water management and conservation practices have affected the usefulness of land.	SS, Sc
4-6	47.	identify and map a local watershed.	Sc, SS
4-6	48.	identify individual and community practices that affect quality of both fresh and marine water resources.	Sc, SS, H
4-6	49.	illustrate how delay increases the cost of cleaning up water.	SS, M
4-6	50.	defend or oppose the statement: "Environmental legislation and enforcement are necessary to preserve the quality of the oceans."	Sc, SS, H, LA
4-6	51.	collect data on the percentage of the world's oxygen supply provided by the oceans and identify the key organisms in this cycle.	Sc, LS
4-6	52.	collect written data or photographic records which provide evidence of the sources of air pollution.	Sc, H, Art, LS
4-6	53.	give examples of naturally occuring air pollution.	Sc, H
4-6	54.	collect evidence of air pollution causing deterioration of concrete, metal, or other materials.	Sc, H
4-6	55.	explain how air is a reusable resource by indicating ways it is cleansed by nature, and to a limited degree by humans.	Sc, H
4-6	56.	propose an experiment which demonstrates air is an essential natural resource.	Sc, H
4-6	57.	evaluate people's attempts to control air pollution by legislation.	SS, H
4-6	58.	volunteer to research how people, plants and machines use air and report this to class.	LA, H, Sc, LS
4-6	59.	explain how heat and light reaching the earth are affected by air quality and influence life.	LA, H, Sc
4-6	60.	describe the personal and financial commitments a person must make in order to have clean air to breathe.	SS, H, V

4-6	61.	design an audiovisual presentation which depicts air quality as "everyone's" responsibility.	Sc, SS, LA, H, Art, Music, Student Act, LS
4-6	62.	collect written data or audiotapes which provide evidence of the sources of noise pollution.	Sc, H, Music, LS
4-6	63.	research the detrimental effects of noise.	Sc, H, Music, C, LS
4-6	64.	describe ways noise pollution can be reduced.	Sc, H, Music
4-6	65.	evaluate people's attempts to control noise pollution by legislation.	SS, H
4-6	66.	design an audiovisual presentation which illustrates the effects of noise pollution.	Sc, H, LA, Art, Music, Student Act
4-6	67.	collect written data or photographic records of littering of land or water.	Sc, H, Art
4-6	68.	research the detrimental effects of litter.	Sc, H, Art, LS
4-6	69.	describe ways litter can be reduced.	Sc, SS, H
4-6	70.	evaluate people's attempts to control littering by legislation.	SS, H
4-6	71.	design an audiovisual presentation which depicts littering as "everyone's" problem.	Sc, SS, H, M, Music, Art, LS
4-6	72.	describe other forms of visual pollution besides littering.	Art
4-6	73.	evaluate people's efforts to control forms of visual pollution.	SS, Art
4-6	74.	suggest ways for reducing all forms of visual pollution.	SS, Art
4-6	75.	explain why trees are renewable resources.	Sc, SS
4-6	76.	identify and explain important functions of a tree or other plant.	Sc, N
4-6	77.	use local examples to describe or demonstrate how trees and other plants control soil erosion.	Sc, SS
4-6	78.	collect and report data demonstating the effects of imported plants and animals on Hawaii's environment.	Sc, SS, LA, HS, LS
4-6	79.	collect and report data demonstrating the results of overgrazing, insects, forest fires and improper management on forests.	Sc, SS, LA, LS
4-6	80.	develop a report which compares short-term gains and long-range effects of various forest management programs.	Sc, SS, LA, C, LS

4-6	81.	suggest alternatives open to society which will assure future supply of forest products (i.e., recycling paper, optional building materials, optional resources for cellulose, tree farming, etc.)	Sc, SS, C
4-6	82.	suggest ways of increasing the recreational values of a forest.	SS, H, Sc, PE
4-6	83.	discuss how wildlife (animals and plants) is a usable resource.	SS
4-6	84.	debate the resolution: "People can survive without most forms of wildlife."	SS, LA, H, V
4-6	85.	relate human activities to various plant and animal species which are becoming endangered or extinct.	SS, Sc, H, LA HS, C
4-6	86.	list and discuss legislation affecting wildlife management.	Sc, SS , C
4-6	87.	select two communities and compare natural resource usage.	LA, SS, H, HS, N, C
4-6	88.	trace three products back to their origin to illustrate the human dependence on soil.	SS, Sc, N
4-6	89.	write a story or drama to depict the changes that occur in a community following the damming, channelizing, or diverting of a stream flowing through it.	SS, Sc, H, LA, HS, N, C, V
4-6	90.	give examples of how irrigation has brought unproductive land into useful production.	Sc, SS
4-6	91.	map location of essential mineral reserves throughout the world.	SS, LA, Art, Sc
4-6	92.	construct a chart or graph showing how advances in technology will increase mineral use.	SS, Sc, M
4-6	93.	construct charts and graphs which compare the use of minerals and fuels from 1900 until the present.	Sc, SS, M
7-9	94.	compute the land area of the world in square kilometers and hectares.	SS, M
7-9	95.	calculate the area of the earth which is compatible to human survival.	SS, M, Sc, M
7-9	96.	estimate the amount of sugar cane (or other crop) that could be grown on hectares covered by highways.	SS, BPA, M
7-9	97.	explain the economic and ecological advantages of using an organic garden.	Sc, BPA, M, N

7-9	98.	discuss the implications of the data provided by charts and graphs which compare the use of minerals and fuels from 1900 until the present.	SS, M, C
7-9	99.	debate the resolution: "The mining industry has an obligation to reclaim the earth's surface it disturbs."	SS, Sc, LA, C, V
7-9	100.	collect information about the changes of wildlife distribution in this community during the past 10 to 20 years and develop a public presentation on the topic.	LA, Sc, HS, Student Act, LS
7-9	101.	write a theme or prepare a speech about wildlife habitat management.	LA, Sc
7-9	102.	plan and implement projects to attract acceptable forms of wildlife to the school ground.	BPA, Sc, LA, Student Act
7-9	103.	design and utilize methods for observing and recording wildlife habits without disturbing its activities.	Sc
7-9	104.	prepare a feasible community wildlife improvement plan.	Sc, SS
7-9	105.	discuss the need for preserving natural areas and related legislative needs.	Sc, SS
7-9	106.	debate the resolution: "People do not need the great blue heron, timber wolf, killer or humpback whale, Hawaiian goose or other wildlife."	LA, SS, Sc, V
7-9	107.	debate the advisability of pet ownership by city dwellers.	SS, Sc, H, LA, AEP, V
7-9	108.	investigate the problem of unwanted pets, contacting the Humane Society for information.	SS, H, Sc
7-9	109.	prepare a world wildlife summary and present findings to the class or other groups.	Sc, SS, LA, M, Student Act
7-9	110.	use data concerning road, industrial and housing construction to estimate how long adequate wildlife habitat, watersheds, recreation areas or good farmland will remain.	SS, Sc, M, LS
7-9	111.	discuss the use of hunting or fishing seasons or periodic closing of certain hunting and fishing areas to manage wildlife.	SS, Sc
7-9	112.	gather data and prepare a presentation on endangered species.	SS, Sc, LA, Student Act, LS
7-9	113.	take a stand on "clear-cutting" forests and provide evidence to convince classmates and/or citizens of this position.	SS, Sc, Student Act, V

7-9	114.	investigate various commercial fishing techniques and discuss their economic and environmental impacts.	Sc, SS, C
7-9	115.	construct maps which illustrate worldwide annual rainfall and temperature.	SS, Sc
7-9	116.	illustrate the hydrologic cycle and how humans have affected it.	Sc, SS, Art
7-9	117.	demonstrate in a formal speech how population distribution patterns are influenced by the distribution of water supply.	LA, SS, H, Sc
7-9	118.A.	identify ways, both public and private, for reducing consumption of potable water.	SS, H, Sc, N, C
	B.	identify ways to increase Hawaii's potable water supply.	
7-9	119.	identify ways to improve water management in school or home.	SS, H, BPA
7-9	120.	list soil and water use practices which affect the rate of soil erosion.	SS, Sc
7-9	121.	calculate the amount of water required to produce various products, both manufactured and natural, including food.	M, Sc, BPA, N
7-9	122.	evaluate the effects of forms of water quality on human environment in different periods of history after reading such writings as Longfellow's "Evangeline", Parts II and III, and Heyerdahl's Ra Expedition.	LA, Sc, SS
7-9	123.	debate the proposition: "Local water quality is adequate for the local needs."	LA, Sc, H, V
7-9	124.	relate, in an imaginative story, what would happen if a supply of clean water were no longer available.	LA, SS, H, Sc, N
7-9	125.	select a newspaper article, poem, story or original writing which emphasizes human or animal needs for pure water.	LA, AEP, N
7-9	126.	explain why the bottled water business is becoming a profitable enterprise in California, France and other places.	SS, H, C, N
7-9	127.	explain how ocean pollution by industrial chemicals or radioactive materials could affect life in Hawaii.	SS, H, Sc
7-9	128.	collect data which shows the effects of pesticides, insecticides, poisonous chemicals, oil, untreated sewage, and fertilizers on life.	SS, Sc, H, M, N, LS

7-9	129.	identify possible untapped water sources and discuss the feasibility of using each.	SS, H, Sc
7-9	130.	discuss available water resources as a measurement of carrying capacity of an area.	Sc, SS
7-9	131.	use various media to report on air quality in this community.	LA, Sc, M, Student Act
7-9	132.	distinguish fact from opinion about air quality expressed in newspaper articles and other media.	LA, Sc, H, LS
7-9	133.	use various media to present a plan for improving the air quality of this community.	LA, H, Sc, SS, Student Act, LS
7-9	134.	design materials to show how smog develops in a major metropolitan area.	LA, Sc, Art, C
7-9	135.	report on air quality in the 19th and 20th centuries. (Read Dickens' A Christmas Carol, "Marleys Ghost.")	LA, Sc, SS, LS
7-9	136.	collect and analyze data on the history of air quality near population centers and relate findings to major changes in life styles such as the industrial revolution.	SS, Sc, M, H, LS
7-9	137.	evaluate Hawaii's efforts to maintain air quality.	SS, H, Sc, HS
7-9	138.	design materials showing the amount of gasoline, paper, meat, milk, bottles, cans, automobiles, water or clothing used by Americans in a year.	LA, M, Art, N
7-9	139.	compare the environmental impact of a native American or pioneer to the impact of a modern American.	H, SS, Sc, N, C
7-9	140.	analyze common life styles in terms of basic needs and human convenience.	LA, SS, BPA, V, N
7-9	141.	analyze the present styles of living in terms of the Earth's limited resources.	SS, H, BPA, V, C, N
7-9	142.	evaluate current advertising practices in terms of their potential environmental impact.	LA, H, Sc, SS, C
7-9	143.	project the Earth's resource depletion rate if all people comsumed natural resources at the rate Americans do.	SS, H, M, Sc, N
7-9	144.	develop a presentation describing the action Americans must take to insure adequate resources for future generations.	SS, Sc, LA, V

7-9	145.	identify four individuals who have worked diligently to improve the environment and express appreciation of their efforts by writing or visiting them.	SS, LA, C
7-9	146.	develop a report on one or more current conservation efforts and project the possible results and impact of those efforts.	LA, SS, Sc, LS
7-9	147.	discuss the physical features of the coastal zone areas of Hawaii.	SS, Sc, HS
7-9	148.	discuss the change in flora and fauna from the seaward limit of the coastal zone to the landward limit.	Sc
7-9	149.	explain why algae and coral are renewable resources and discuss the constraints on this renewability.	Sc, SS
7-9	150.	identify and explain important functions of algae and corals.	Sc, N
7-9	151.	discuss the economic value of coral in Hawaii.	SS, Sc, M, C
7-9	152.	suggest ways of increasing the recreational values of a beach area and discuss the possible impact on the environment of those ways.	Sc, SS, H, PE
10-12	153.	discuss the responsibilities and functions of international, federal, state, and county governments in coastal zone management.	SS, Sc, AEP, C
10-12	154.	suggest alternatives open to society which will assure future supply of food from the sea (aquaculture, limited fishing quotas, or other methods) and discuss the possible impact of each alternative.	Sc, SS, N, C
10-12	155.	describe in a report the role of the U. S. Forest Service, state government, industry or individuals in managing forests.	SS, Sc, LA, C, LS
10-12	156.	identify several organizations responsible for improving the environment and explain the role each is playing in solving environmental problems.	SS, Sc, C
10-12	157. A.	collect and evaluate supply and demand data on local-, state-, national- or world-projected demand of two or more non-renewable resources and predict the zero supply date for each.	Sc, M, Bus, LS
	B.	propose methods for delaying the zero supply date of a non-renewable resource and analyze the effects of these proposals on the environment and life styles.	Sc, SS, Bus, H Ec IA, IT, Ag, V, C
	C.	select a plan to delay zero supply dates and design a program to communicate the need for action.	Sc, LA, SS, Bus, H Ec, IA, IT, Ag, Student Act

		D. analyze the environmental impact of utilizing one or more natural or human made substitutes for a non-renewable resource, considering supply, energy needed to secure and process it, and its potential as a pollutant.	Sc, M, Bus, IA, IT, C
10-12	158.	A. secure and evaluate data on the local, state, national and/or world supply of renewable resources, their current depletion rate (in terms of both quantity and quality) and the demands of society on the products of these resources and determine the various mechanisms that affect the depletion of one or more of these resources.	Sc, SS, Bus, M, LS
		B. propose method(s) for arresting and, if possible, reversing the depletion rate of a renewable resource to provide an optimal steady state supply of the resource and analyze the effects of the proposals on the environment and life styles.	Sc, SS, M, Bus, IT, IA, H Ec, V, C
		C. design a program for communicating the need for action to arrest and/or reverse the depletion rate of a renewable earth resource.	Sc, LA, SS, IT, IA, Bus, Student Act
10-12	159.	define the role which science and technology can and should play in developing and implementing solutions to an earth resource problem.	Sc, Bus, SS, IT, IA, C, V
10-12	160.	describe ways our streams, lakes, or ocean resources are being misused and propose a plan which would alleviate each problem.	SS, H, Sc, V
10-12	161.	locate areas on a Hawaii map having primary, secondary and tertiary sewage treatment plants, and describe the environmental impacts of these plants.	SS, H, Sc, C
10-12	162.	defend or oppose a plan to construct another highrise building, major highway, or other construction.	Bus, SS, H, Art, C, V
10-12	163.	predict the future of game fish in the ocean surrounding Hawaii and describe the human and environmental impact of that prediction.	Sc, H, Bus, C, HS
10-12	164.	construct a world map showing major water pollution centers (rivers, lakes, oceans) and sources and discuss their probable permanence.	SS, H, Sc, C
10-12	165.	determine and compare per capita consumption of various resources such as minerals, water, food, or oil by different societies.	SS, H, M, Bus, IT, HS, N, C

10-12	166.	conduct research to determine far-reaching effects of pollutants dumped into nearby streams, lakes or ocean areas and report this information to class and community.	SS, H, Sc, Student Act, LS
10-12	167.	present views concerning the economic and ecological implications of using algae from the ocean as food supplement.	H Ec, Sc, M, N, C
10-12	168.	research and report the economic and ecological feasibility of using desalted ocean water for purposes of irrigation and human comsumption.	Sc, Bus, SS, H, IT, M, N, C, LS
10-12	169.	determine the percentage of naturally recycled oxygen resulting from the ocean, identify the organisms involved, describe the effect of pollution on these organisms and propose a model regulatory system for coping with these problems.	Sc, SS, H, M
10-12	170.	plan and conduct a mass media presentation dealing with water and/or air quality.	LA, Sc, SS, H, AEP, Student Act
10-12	171.	design and/or participate in a school site management plan.	IT, SS, Bus, Sc, Ag, Student Act
10-12	172.	develop a farm land use and management plan that will maximize the land's potential service to present and future generations.	Ag, SS, Sc, C
10-12	173.	identify and explain problems resulting from intensified food production.	Ag, H, Sc, N, C
10-12	174.	review how books like Steinbeck's Grapes of Wrath identify the effect of human manipulation of the land.	LA, SS, Sc, C
10-12	175.	discuss the effects of water wildlife management using as examples the brown pelican, Hawaiian goose, swordfish, killer whale, or other animals.	SS, Sc, C
10-12	176.	prepare a report on annual activities dealing with wildlife management in which individuals and the school could participate.	LA, Sc, Student Act, C, LS
10-12	177.	investigate and report on possible environmental careers.	Sc, H, SS, C, LS
10-12	178.	become actively involved in a civic environmental problem that is immediate and relevant and make periodic reports on progress to the class.	LA, SS
10-12	179.	analyze the impact the news media has on public views of environmental issues.	LA, SS, Bus, Sc

10-12	180.	debate the resolution: "The United States cannot afford to build smaller cars, produce less clothing, construct fewer highways, or use other less energy intensive strategies."	Bus, SS, LA, M, C
10-12	181.	investigate and report on the progress of aquaculture in Hawaii.	Sc, LA, Bus, SS, IT, Ag, C, M, LS

INSTRUCTIONAL GOAL C:

Students will voluntarily participate in programs involving resource reclamation.

SUGGESTED GRADE LEVEL		INSTRUCTIONAL OBJECTIVES: Provided with the necessary experiences, data and information, students will:	SUGGESTED SUBJECT AREAS
K-3	1.	identify and give examples of items which should be used more than once.	SS, Sc
K-3	2.	identify areas in the community where wastes are treated, handled or dumped.	SS, Sc
K-3	3.	compare space taken by two emptied cans when one is flattened and one is not and discuss the effects of flattening cans on transportation and storage of household trash.	Sc, LA, M
K-3	4.	propose a better use for cans than throwing them in the garbage.	Sc, SS, C
K-3	5.	tell how families recycle wastes.	Sc, H, SS, N
K-3	6.	collect all the litter found on the school grounds in a day and estimate the amount of litter produced per student in the school.	M, Sc
K-3	7.	organize a program to encourage others to help prevent the school grounds from becoming littered.	Sc, SS, LA, PE, Student Act, V
K-3	8.	plan and participate in collection campaigns which will help in the recycling of waste materials.	Sc, SS, H, Student Act.
K-3	9.	classify litter collected around the school (or in the neighborhood) into various groups like natural or human-made, plastic or non-plastic, or container or non-container.	Sc
4-6	10.	identify items used which may be recycled.	Sc, SS
4-6	11.	identify some specific nearby locations in this community where recyclable materials may be taken for processing.	Sc, SS, H

4-6	12.	suggest possible methods of recycling for this community which would be both practical and suitable for maintaining a high quality of life.	Sc, SS, H
4-6	13.	prepare a presentation about the amount of waste materials produced in the school or community.	LA, Art, Student Act, LS, N
4-6	14.	defend the recycling of paper, metals, plastics or other material using data regarding the depletion of that particular resource of raw materials and energy costs of recycling.	SS, Sc, M
4-6	15.	ask five families if they would be willing to recycle their solid wastes and report findings of survey to class.	LA, SS
4-6	16.	identify materials used daily and trace them to minerals used in making the product.	SS, Sc, N
4-6	17.	use various media to depict how waste disposal is related to environmental quality.	Sc, SS, H, LA, Art, Student Act, LS
4-6	18.	predict the effects of paper recycling programs on forests.	SS, Sc, C
4-6	19.	plan a presentation encouraging solutions to pollution problems.	LA, H, SS, Sc, V, LS
7-9	20.	give three examples of how humans waste minerals in daily living habits and propose a better use plan for each.	SS, Sc, BPA
7-9	21.	predict the effects of not recycling minerals in terms of future costs and availability.	SS, M, BPA, C
7-9	22.	calculate the tons of recyclable materials produced in the United States in a year.	SS, M, BPA
7-9	23.	use current data on use of minerals to project future reserves and examine how mass recycling would change this projection.	SS, M, BPA
7-9	24.	debate the resolution: "Each American family should be restricted to one car."	SS, Sc, LA, V
7-9	25.	debate the resolution: "Non-returnable bottles and aluminum cans should not be allowed in school buildings."	SS, Sc, LA, BPA, V
7-9	26.	identify materials which can be recycled and propose a plan to accomplish maximum recycling in the community.	SS, Sc, BPA, C

7-9	27.	plan and publicize a recycling project.	LA, BPA, SS, Sc, Student Act.
7-9	28.	list practices in the home which waste resources and propose better practices.	SS, Sc, BPA, H, N
7-9	29.	evaluate existing recycling programs in the community.	SS, Sc, H, BPA
7-9	30.	analyze the effect of various waste disposal systems on the environment and state the conditions which would make each system advisable.	Sc, H, SS, BPA
7-9	31.	debate the resolution: "Business and industry are currently fulfilling their responsibility in the management of non-renewable resources."	SS, LA, Sc, H, AEP, C, V
7-9	32.	discuss the adequacy of existing solid waste laws.	SS, Sc, V
7-9	33.	develop a state non-renewable resource management model.	SS, Sc, M
7-9	34.	discuss the adequacy of federal and state budgeting for the development of solid waste recycling.	SS, Sc, M
7-9	35.	discuss the relation between a nation's waste burden and its level of civilization.	SS, LA, HS
10-12	36. A.	compile enough information to classify human, industrial and business wastes into one or more of the following categories: returnable and reusable in form, a reclaimable by-product, recyclable by technology (i.e., would require small energy input), recyclable with great energy consumption or practically non-recyclable.	Sc, SS, Bus, IT, C
	B.	classify non-recyclable and expensively recyclable wastes as essential by-products of human life or by products of human convenience.	Sc, SS, Bus, H Ec, V
	C.	assess the environmental impact of the accumulation of wastes not easily recyclable, but essential by-products of human life, on the continuing evolutionary processes of the earth and propose optimal methods for the management of these wastes.	SS, Sc, H, C
	D.	use data to propose viable programs for minimizing the accumulation of human-generated wastes in the air, water and soil and analyze the effects of such programs on life styles.	Sc, SS, Bus, H Ec, IT, V, C
	E.	design a program to effectively communicate the need and feasibility of recommended action for an acceptable waste management program.	LA, SS, Sc, H, Bus, IT

10-12	37.	collect the needed information on two or more current or proposed methods of waste disposal and compare their potential environmental impact in terms of harboring pests and disease and/or poisoning various life forms (e.g. landfills vs. open dump, septic tank vs. secondary treatment).	Sc, SS, H, LS
10-12	38.	illustrate how changing "life styles" may prevent a world catastrophe.	SS, Bus, Sc, LA, V, C, N
10-12	39.	evaluate the following waste management proposals:	SS, H, H Ec, LA, Sc, Ag, IT, Bus, C
	A.	"ship solid waste to abandoned mines to be stockpiled for future use."	
	B.	"compress trash into building bricks."	
	C.	"mulch solid waste for use as fertilizer."	
	D.	"simplify and/or reduce packaging of solid products."	
	E.	"use reusable packaging for all liquid products."	
10-12	40.	document the extent of open dumping in the community and discuss its impact on community pride.	SS, LA, Sc, V
10-12	41.	collect data on ocean dumping and its potential hazard to the plants, animals and humans.	SS, Sc, H, N, LS
10-12	42.	review current federal, state or local legislation dealing with solid waste disposal and examine its strengths and inadequacies.	H, SS, Sc, C, M
10-12	43.	plan a community recycling project of as many items as the class determines to be practical.	SS, H, LA, Sc, V
10-12	44.	plan an organic gardening project for home, school or community which demonstrates the value of recycling organic wastes.	SS, H Ec, Ag, Sc, N
10-12	45.	construct a model of a typical septic system, describe the function of each part and/or discuss its adequacy as a treatment system.	H, Sc
10-12	46.	investigate the possibility of installing a "Lagoon System" in the community and report findings to the school and community.	H, Sc, SS, LA, Student Act, M
10-12	47.	calculate the cost per family of various types of sewage treatment systems and compare their effectiveness.	H, M, Sc, Bus
10-12	48.	demonstrate the effect of thermal pollution on algae growth and its effect on other life in the water.	H, Sc, Bus, N

10-12	49.	determine techniques for locating sources of water pollution.	H, Sc, Bus, Art
10-12	50.	identify polluters of water in the area and describe steps that a private citizen can take in an attempt to correct each problem.	H, SS, Sc, Bus
10-12	51.	identify diseases which may result from the drinking of polluted water.	H, Sc
10-12	52.	develop a workable plan for recycling water which would be appropriate for the community.	H, Sc, SS

INSTRUCTIONAL GOAL D:

Students will demonstrate their awareness and knowledge of population processes and dynamics.

SUGGESTED GRADE LEVEL		INSTRUCTIONAL OBJECTIVES: Provided with the necessary experiences, data and information, students will:	SUGGESTED SUBJECT AREAS
K-3	1.	explain feelings about overcrowded conditions after two classes have shared a classroom for a period of time.	SS, Sc, V
K-3	2.	list places to play and compare them to places they would like to play.	SS, PE, V
K-3	3.	make observations of a closed terrarium or aquarium and record by pictures the changes in population which occur throughout the year.	Sc, Art
K-3	4.	observe and record changes in the outdoor populations which occur as the seasons change.	Sc, M
K-3	5.	compare the number of people who live in a single building in the city with people per building in the country (after a trip to the country or city).	SS, M
K-3	6.	compare the play of children who live in an urban setting with the play of children who live in a rural setting (after a trip to the city or country.)	SS, PE
K-3	7.	compare the sizes of all families in the classroom.	SS, M
4-6	8.	compare available space per person today with the space that was available in the year 1900.	SS, Sc, M
4-6	9.	compare the ease with which various human wants and needs can be met in urban and rural environments.	SS, H, Sc, LA, V
4-6	10.	identify some effects that food, disease, birth rate and land use have upon life expectancy.	SS, H, Sc, N
4-6	11.	compare the roads of long ago with modern day roads, showing change in use due to population growth and changes in life styles.	SS, LA, HS

* See definition of Population Education on Page D31

4-6	12.	construct a food web for an eco-community that has been observed.	Sc, SS, N
4-6	13. A.	establish a balanced aquarium either at school or at home.	Sc, SS
	B.	identify population variables which, if manipulated, would have an effect on the aquarium environment.	Sc
	C.	suggest changes which would occur in the aquarium for each of the variables listed above.	Sc
	D.	test the effect of each variable on the aquarium environment and record observable changes.	Sc
	E.	relate the changes that occurred in the aquarium to their causes.	Sc, LA
4-6	14.	describe some aspect of life in Hawaii that has changed in the last two hundred years and relate this change to population changes.	SS, LA, HS, C
4-6	15.	illustrate how a population concentration can affect the pleasures coming from leisure-time activities like camping, hiking, sports, or nature study.	SS, LA, H, PE, Sc
4-6	16.	illustrate how the population of either plants, animals or humans with a given area affect the quality of life of each organism.	SS, LA, H, Sc, V
4-6	17.	investigate fish sizes in various lakes, aquariums, ponds, or tidepools and relate to population concentrations.	LA, H, Sc, M
4-6	18.	debate the issue: Deer, goat, or wild pig hunting is necessary to maintain a balance in wildlife areas.	SS, LA, Sc, V, C
4-6	19.	list ways overcrowded classrooms affect learning (poor air, noise, room for walking, etc.) and suggest how such problems might be overcome.	SS, LA, H, Sc
4-6	20.	discuss ways that noise pollution is affected by increasing population concentration.	Sc, H
4-6	21.	construct a model which demonstrates an ecological balance among plants and animals.	SS, Sc
7-9	22. A.	use media to show environmental changes resulting from overpopulation.	SS, LA, Sc, Art, PE, AEP, Student Act, LS
	B.	defend assumptions used in a presentation on overpopulation.	SS, LA, H, Sc

7-9	23.	relate population growth and human use of energy and resources to some of today's more serious environmental problems.	SS, H, Sc, LA
7-9	24.	gather and interpret data demonstrating the geometric increase of population and the arithmetic increase of food production and discuss implications.	SS, M, Sc, LA, LS
7-9	25.	relate overcrowding to health problems.	SS, H, Sc, LA, PE, AEP, N
7-9	26.	use rational argument to debate the topic: Population controls should be set by the government.	SS, H, Sc, LA
7-9	27.	debate the proposition: "The government should compensate married couples for each five years they remain childless between ages 14-49."	SS, LA, V
7-9	28.	predict the changes that would take place in one's family life if one's mother gave birth to triplets.	SS, H, LA, CA
7-9	29.	list and describe four practices cities should follow to cope with crowding problems.	SS, H, Sc, C
7-9	30.	compare the merits of highrise apartments with those of single-family dwellings in terms of quality of life and environmental impact.	SS, H, Sc, PE, Art, V
7-9	31.	discuss the psychological and physical effects resulting from crowding in large cities and identify what can be done to solve some of these problems.	SS, H, Sc, PE, Art, V
7-9	32.	demonstrate, using written or oral communication, how population size affects the accuracy of information transfer.	SS, LA
7-9	33.	infer from graphed data on world population growth for the past 20 centuries some resulting social and economic problems.	SS, H, M, Sc, C, V
7-9	34.	graph the change in population concentrations per square mile or kilometre for Hawaii during the past 200 years. Relate this change to the quality of life and discuss the implications if these trends continue.	SS, M, Sc, PE, Art, H, HS
7-9	35. A.	graph the population of the earth at the beginning of each century, zero A.D. to the present.	SS, Sc, H, M
	B.	extrapolate from current world population growth data the expected world populations for the year 2000 and 2500 and use this information to predict the future needs for food, water, and energy and mineral resources.	SS, H, M, Sc, V

		C. prepare a report which evaluates present farming methods and project changes necessary to meet the needs of various predicted world populations.	SS, H, LA, Sc, C, LS
		D. defend land-use planning in terms of meeting future needs for all aspects of human existence.	SS, Sc, H, LA, PE, Art
		E. role play different national leaders solving predicted food problems.	SS, H, Sc, LA, N
7-9	36.	calculate the hectares removed from food production by urbanization.	SS, M, N
7-9	37.	A. use data to compare population growth rates of under-developed, developing and developed countries.	SS, M
		B. list and discuss societal, cultural and family values which may account for differences observed above.	SS, LA, H, V
		C. analyze pressures upon government agencies in each of the national categories above when attempts are made to manage population growth.	SS, LA, V
		D. predict future action countries may have to take to feed, clothe and house their people.	SS, Sc, N
7-9	38.	predict the effects that a 2 percent increase in world population would have on resources and ecosystems.	SS, H, Sc, M
7-9	39.	analyze the effect of an increasing population on wildlife.	SS, Sc
7-9	40.	use various media to demonstrate changes which would occur in nature if America's population were doubled.	LA, Sc, Art, Student Act, LS
7-9	41.	debate the topic: "Resolved that population growth makes solution of other environmental problems futile."	SS, H, Sc, LA, V
7-9	42.	discuss the feasibility of solving the earth's population problems by space migration.	SS, H, Sc, M
7-9	43.	indicate how experiences in the study of population can affect attitudes.	SS, LA, V
10-12	44.	debate the following statements:	SS, H, Sc, Bus, LA, H Ec, V, N
		A. "Resolved that in order to control population, welfare recipients should not receive allowances for child support."	
		B. "Resolved that money spent on war and space exploration could be better spent on solving population and pollution problems."	

		C. "Resolved that oceanic space, food and mineral resources can be used to support a doubled world population."	
		D. "Resolved that increasing the industrial capability of a community will improve the quality of life of its citizens."	
		E. "Resolved that the tax structure should be altered to penalize large families."	
10-12	45.	A. evaluate the following proposals: "Families must limit themselves to two children."	SS, H, Sc, LA, H Ec, AEP, V, N
		B. "The United States should insist on population control measures as a prerequisite for food aid to foreign countries."	
		C. "The federal government should fund research on birth control."	
		D. "The United Nations should develop programs to meet the needs of the world's current population growth."	
		E. "Family planning centers should be developed in all communities."	
10-12	46.	investigate population growth in the community by collecting and computing birth and death rate data.	SS, M, Sc
10-12	47.	A. participate in a mock trial in which one or more persons is accused of violating Zero Population Growth (ZPG) requirements in the future.	LA, SS, V
		B. stage a future mock United Nations hearing in which one or more nations has been called into question for failing to implement Zero Population Growth.	SS, Sc, AEP, V
		C. debate the position: "Controlled birth and death is the only way to control population."	SS, LA, H Ec, V
10-12	48.	predict, based on population for the years 1850 to the present, when this planet will likely have more people than its resources can feed, clothe and shelter.	SS, H, M, Sc, N
10-12	49.	A. secure and evaluate data (both historical and current) on population trends of the community, county, state, nation and/or world.	Sc, SS, LS
		B. secure and analyze data on the impact of population concentration on life styles.	Sc, SS, PE, H Ec, Art, V, C, LS

		C. use the data analyzed above to develop and defend a position on the need to regulate population.	SS, Sc, LA, V
		D. calculate how long it will take to establish ZPG and what this stabilized population will be if a program to limit women to two children is immediately implemented.	Sc, M
		E. evaluate various mechanisms in terms of effectiveness, usability and moral acceptability.	Sc, SS, V
		F. discuss the impact of a forced ZPG on life style and value system.	H, SS, LA, Bus, H Ec, V
		G. develop a plan to communicate these findings and conclusions to various groups.	LA, SS, Student Act.
		H. project the effect that an increasing world-wide life expectancy of 10 years would have on a stabilized population level if population control mechanisms were to remain static.	M, Sc, SS
10-12	50.	discuss whether advancements in medical science have been a blessing to humans.	SS, LA, H, Sc, V
10-12	51.	identify at least six environmental problems related to overpopulation and explain these relationships.	SS, H, Sc, LA, C
10-12	52.	compare the effects of increasing population and changing life style on resource use.	SS, H, Sc, LA, N
10-12	53. A.	use various media to depict the confrontations that would take place on a long-term spaceship voyage if the passengers did not observe ZPG policies.	LA, Sc, SS, H, LS
	B.	relate these projected confrontations to the future of the Spaceship Earth.	SS, LA, Sc
10-12	54.	relate revolutionary activity and political unrest to crowding and validate inferred relationships by reviewing the history of armed conflict.	SS, H
10-12	55.	assume a future world population of 7 billion in the year 2000 and depict the effect of this population on the quality of life.	SS, LA, H, M, PE, Art, Sc, N
10-12	56.	extrapolate population and food production data to the point where the demand for food in this country and/or world will equal the supply.	SS, Sc, M, Ag, N
10-12	57. A.	research the reasons why the rate of population growth in Hawaii is twice the rate of the mainland.	SS, H, M, H Ec, HS, LS

		B. identify and explain economic, social, and environmental problems in Hawaii related to increasing population.	SS, H, Sc, Ag, C, HS
		C. prepare a report on the problems caused by population explosion in other countries.	SS, H, Sc, LA, Agri, C, LS
		D. propose feasible solutions for dealing with rapidly increasing populations in Hawaii or in other states or countries.	SS, H, Sc, Ag, C, N, V
10-12	58.	list and explain ways in which the United States population and life style affects the resources of other countries.	SS, H, Sc, H Ec, AEP, N, C
10-12	59.	use various media to illustrate how individual acts, duplicated or compounded, produce significant environmental alterations.	LA, Sc, SS, LS
10-12	60.	evaluate the possibility of mass migration to another planet to ease the Earth's load by calculating the energy requirements for such migrations based on two or more rates of population growth.	M, Sc
10-12	61.	investigate the family planning being considered by at least five young married couples in the community.	SS, H, H Ec, V
	62.	suggest changes in the school program which would allow twice the number of students to be accommodated without increasing school facilities.	SS, H

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* WHAT IS POPULATION EDUCATION?

Population education is defined as the process by which the student investigates and explores the nature and meaning of population processes, population characteristics, the causes of population change and, most important, the consequences of these processes, characteristics and changes for oneself, one's family, one's society and the world.

The goal of population education is to assist students to conceptualize the relevance of population for themselves, to assist them thereby to make rational and responsible individual and collective decisions about population matters, utilizing appropriate information and analytic skills. For the family, the goal can be stated as responsible fertility behavior; for the community, as rational and responsible decisions on population and public policy.

Population education is meant to educate, not to propagandize or indoctrinate. Population education views population not as a "problem" to be solved but as a "phenomenon" to be understood. The goal of understanding is to provide the intellectual underpinning for responsible action. Population education programs must also involve students in an exploration of their own values and attitudes.

INSTRUCTIONAL GOAL E:

Students will demonstrate an appreciation for the interdependence of living things in the closed earth system.

SUGGESTED GRADE LEVEL		INSTRUCTIONAL OBJECTIVES: Provided with the necessary experiences, data and information, students will:	SUGGESTED SUBJECT AREA
K-3	1.	describe how people in the community are dependent upon other communities for food, clothing and shelter, e.g., grassland communities, oceanside communities, forest communities, or other communities.	Sc, SS, H, N, C
K-3	2.	describe ways in which human presence in this community has produced changes from its original natural state (construction of roads, bridges, houses, businesses, factories, etc.).	Sc, SS, H, HS
K-3	3.	compare air and/or soil temperatures recorded at the same time for classrooms, playgrounds, lawn flower beds, wood lots and explain why these temperatures are not the same.	Sc, M
K-3	4.	correctly identify local plants that may be harmful to people like oleander, castor bean, jimsonweed, or others.	Sc, H
K-3	5.	identify common plants found on the school playground and develop a key to classify and identify them.	Sc
K-3	6.	identify several animals on sight or from pictures.	Sc, LA
K-3	7.	deduct from a set of animal tracks (or picture of them) what the animal was, where it came from and what it might have done.	Sc
K-3	8.	construct a terrarium.	Sc
K-3	9.	report on the needs of an animal or bird.	LA, Sc, N
K-3	10.	develop and present an imaginative story telling what happened to them as a frog or other animal when they went out to dinner.	LA, Sc
K-3	11.	identify a number of birds or other small animals found in the area and describe their food and nesting requirements.	Sc, LA, N

K-3	12.	develop and execute a plan to improve bird habitats such as building nesting boxes or establishing ground cover.	Sc, M
K-3	13.	pretend to be a gecko and explain where you would look for food, shelter and protection from enemies.	LA, Sc
K-3	14.	discuss the effects that burning weedy fields and fence rows have on the nesting grounds of birds and small animals.	Sc
K-3	15.	express in a creative play feelings about people destroying the habitats of animals.	LA, Sc, PE
K-3	16.	compare some food chains that have been observed.	Sc, SS
K-3	17.	generate a story or play which would depict what life would be like if pigs and cows became extinct.	LA, SS
K-3	18.	carry out a study to determine how homeless cats and dogs may be a problem in the community.	Sc, SS, H, M
K-3	19.	identify the necessities for life on a space-ship by drawing or cutting out pictures of the needed supplies.	Sc, LA, SS, Art, PE, N
K-3	20.	identify some endangered species of animals or plants and describe factors leading to their extinction.	Sc, SS, H, N
4-6	21.	depict in a class play a family living in harmony with the environment.	LA, SS, Sc, PE, N
4-6	22.	classify ecological processes occuring locally as beneficial or detrimental.	SS, H, Sc
4-6	23.	identify major categories of human needs for support and maintenance of life.	Sc, SS, N
4-6	24. A.	record observations made about wildlife found in the neighborhood during each season of the year.	Sc, LA
	B.	prepare a report which contains observations and conclusions formed as a result of the study.	Sc, LA
4-6	25.	give examples of simple predator-prey relation-ships.	Sc, SS
4-6	26.	suggest possible results of disruption in predator-prey relationships.	Sc, SS

4-6	27.A.	construct a food chain of a given animal and describe the effect if this chain were to be broken.	Sc, LA, SS, N
	B.	describe the interrelationships in the food web of a chosen community.	Sc, LA, SS, N
	C.	describe the interrelationship between the elements of a human community web such as churches, service stations, grocery stores, banks, schools, etc.	Sc, LA, SS, N
	D.	describe the interrelationships between the music instruments of an orchestral web.	Music, Sc
4-6	28.	name three wild animals commonly found in Hawaii and list the major elements of a suitable habitat for each.	Sc, SS, HS
4-6	29.	demonstrate two ways living things are interdependent.	Sc, SS, H
4-6	30.	predict the results of the addition of a new species to a balanced ecological system.	Sc, SS
4-6	31.	give examples of organisms which can be harmful to humans but are helpful in maintaining a balance between living things.	Sc, H, SS
4-6	32.	construct a chart showing green plants as the basic source of human supplies for food, clothing, shelter and energy.	Sc, SS, Art, N
4-6	33.	discuss why pesticides are often used even though they may be detrimental to many species of life.	SS, H, Sc, N
4-6	34.	develop an imaginative story of one day in the life of a plant or animal that has been observed.	LA, Sc
4-6	35.	give examples of people preserving or destroying the earth's life support systems.	Sc, H, SS
4-6	36.	describe types of natural organic decomposition and identify ways that human actions have disrupted these natural cycles.	Sc, SS
4-6	37.	construct food chains with human beings as the terminal consumer.	Sc, SS, N
4-6	38.	demonstrate how people are a part of the ecosystem and must live within it.	Sc, SS, H
4-6	39.	formulate a model to illustrate the finite nature of the earth system.	Sc, SS, H

7-9	40.	support with data why the earth's resources, even with optimum recycling systems, can support only a limited population.	SS, Sc, H, N
7-9	41.	discuss why people must abandon their "use and move on" practices.	SS, Sc, H
7-9	42. A.	give examples of how survival of an organism depends on its ability to adjust to its environment.	Sc, SS, H
	B.	explain how people make the most of their adaptations through the use of their intelligence.	Sc, SS, H, N
7-9	43.	construct food webs which contain various specified animals such as mongoose, toad, rat, tuna, shark, cow, sparrow or human beings.	Sc, SS, N
7-9	44.	trace the journey of a particle of matter through a living organism from dust to dust.	Sc, SS
7-9	45.	develop and describe an experiment to test a hypothesis to reduce population in this country.	Sc, SS
7-9	46.	collect evidence showing how the "balance of nature" has become upset with the removal (or addition) of a species from (or to) an eco-community.	Sc, SS
7-9	47.	illustrate how the carrying capacity of an area is determined by certain ecological factors.	Sc, SS
7-9	48.	construct various microhabitats and test their carrying capacity in terms of a given species.	Sc, SS
7-9	49.	evaluate the truth of the position: the interdependence of animals and plants provides a balance between living things on Earth and does not allow overpopulation.	Sc, SS
7-9	50.	diagram the interrelationships of animals and plants in the community and report how daily activities affect this interdependency.	Sc, SS, H
7-9	51.	explain the complexities of an ecological problem within a given ecosystem.	Sc, SS, H, LA
7-9	52.	identify an ecological problem in the community and design a program to correct it.	SS, Sc, H
7-9	53.	report on an overload system that they have observed.	LA, Sc, H, N

7-9	54.	formulate a hypothesis about how changed environmental practices may affect the ecological balance.	SS, Sc, H
7-9	55.	discuss how the manipulation of one environmental element affects all elements.	SS, Sc, H
7-9	56.	identify how the CO_2-O_2 (carbon dioxide-oxygen) cycle is affected by the actions of businesses and industries, and citizens in the community and discuss what one can do to improve the CO_2-O_2 cycle.	SS, Sc, H, C
7-9	57.	suggest ways to guard against detrimental environmental manipulations of ecosystems.	Sc, H, LA, SS, V
7-9	58.	explain what an environmental impact statement is and how it is used.	SS, Sc
7-9	59.	identify industrial practices which minimize detrimental impacts on the environment	SS, Sc, H, BPA, C
7-9	60.	gather, interpret and disseminate information concerning the effects of chemicals (pesticides, phosphates, or others) on functioning ecosystems.	Sc, LA, H, LS, N
7-9	61.	design an experiment to investigate the effect of detergents on fish.	Sc, H
7-9	62.	collect data to illustrate the change in algae species that result from increased detergent use.	Sc, H, SS
7-9	63.	hypothesize about ecological problems resulting from the destruction of a marsh.	Sc, SS, H
7-9	64.	brainstorm and contribute to a list of ideas on the question: How can people live in harmony with nature in the 20th and/or 21st century?	LA, SS, Sc, H, N
7-9	65.	construct a model of a watershed which shows how living organism interact with each other and their environment.	SS, Sc, LA, H, Art
7-9	66.	develop a satirical television presentation highlighting the concept that an area can support only a limited number of organisms.	Sc, LA, SS, H,
7-9	67.	observe and describe the natural and ecological beauty of a pond and discuss life styles needed to preserve its delicate balance.	LA, SS, Sc, Art, V
7-9	68.	portray through media the natural and ecological beauty of a river and discuss life styles needed to preserve its ecological function.	LA, SS, Sc, Art, V, Student Act

7-9	69. A.	construct an operational definition of a closed system after gathering data concerning the needs and limitations imposed on a spaceship crew during a trip to Mars.	Sc, H, SS, LA
	B.	write and produce a drama which depicts an extended voyage through space in a closed spaceship system.	LA, Sc, SS, H, Student Act
	C.	describe plant-animal interdependence within a spaceship during a flight to a near star.	Sc, SS, LA, H
7-9	70.	describe Oahu's or your Island's available water supply and discuss the Island's carrying capacity based on available water resources.	Sc, H, SS, HS
10-12	71.	develop a documentary media presentation showing the dependence of all living things on pure water.	Sc, H, Art, SS, Student Act, LS
10-12	72.	observe and report on the natural steps which occur in lakes, rivers, etc., to decompose waste.	Sc, H, SS, Ag
10-12	73.	provide ecological reasons why some species of animals once in Hawaii's lakes and streams are no longer there.	Sc, H, SS, HS
10-12	74.	collect data and chart changes of a local pond, lake or river over an extended period of time.	Sc, SS, M
10-12	75.A.	evaluate the environmental impacts that have resulted from the draining of marshes in Hawaii.	Sc, SS, Bus, Ag, HS
	B.	evaluate the environmental impacts that have resulted from channelizing streams in Hawaii.	Sc, SS, H, Ag, V
10-12	76.	defend reasons for advocating certain social and/or governmental controls which limit the people's freedom in determining their own life style.	Sc, SS, V
10-12	77.	describe one cause and effect relationship which occurs as a result of human attempts to exterminate predators.	Sc, LA
10-12	78.	debate the validity of the premise: "The history of people is the history of their growing mastery over nature."	Sc, LA, SS, AEP, V
10-12	79.	discuss the hypothesis: "The biosphere, as it occurs on earth, is a single macro-organism."	Sc

10-12	80.	draw, or describe, a food chain which shows how animals collect insecticides, pesticides, or other chemical residues in their bodies.	Sc, LA, H, Ag, Art
10-12	81. A.	develop a compost pile.	Sc, Ag
	B.	observe and report on the natural processes occuring in a compost pile.	Sc, LA, Ag
	C.	relate composting to maintaining an environmental quality.	Sc, Ag
10-12	82.	propose action to remove harmful insecticides and pesticides from the market.	Sc, H, Bus, SS, Ag
10-12	83.	report on research being done to prevent future products from being marketed until adequate testing data proves them safe.	Sc, SS, Bus, N, LS
10-12	84.	offer alternatives to the use of insecticides for insect control.	Sc, Ag
10-12	85.	predict the future of human beings if we continue to pollute the environment with pesticides.	Sc, H, SS, Ag, AEP
10-12	86.	select an article from a popular periodical (or newspaper) dealing with environmental problems and analyze cause and effect relationships stated in it as to whether these relationships are observations, substantiated conclusions based on observations, supportable hypotheses or merely inferences of the author.	LA, Sc, SS, LS
10-12	87.	listen to a radio or television program dealing with the environment and analyze cause and effect relationships presented in it as to whether these relationships are observations, substantiated conclusions based on observations, supportable hypothesis or merely inferences of the author.	LA, Sc, SS
10-12	88.	select a plant or animal that has been introduced into Hawaii (an exotic) and describe its effect on the ecological balance.	Sc, HS
10-12	89. A.	select an isolated biological community and analyze it in terms of identifying all possible ecological relationships between individual organisms and species within it.	Sc
	B.	analyze the above biological community in terms of any natural ecological succession that is occurring within it.	Sc

		C. further investigate this biological community to identify any imports and exports (including animal migration) of energy and matter occurring.	Sc
		D. impose a hypothetical change upon this biological community (such as a sudden change in the population or habits of one native species, temperature, rainfall or the introduction of foreign matter or species) and trace the ecological disturbances that would occur in the community.	Sc, SS
		E. use the model developed in the four objectives above to formulate a model for the closed earth system.	Sc, SS, H
		F. analyze and project the impact of various human activities upon the model earth system.	Sc, SS
		G. use various communicative techniques and art forms to present ecological problems that have been investigated in the six above objectives.	LA, Art, SS, Sc, Student Act
10-12	90.	A. select a specific natural resource available to another country (uranium ore in Mainland China, oil in the Middle East, caviar in Russia, sugar in Cuba or other natural resource) and discuss the various impacts of this supply on our lives.	SS, Sc, AEP, C
		B. discuss the political, economical, historical and cultural implications of the world distribution of various natural resources.	SS, Bus, LA, Sc, C
10-12	91.	A. select a proposed local construction project and carry out the environmental impact study.	SS, Sc, PE
		B. secure a copy of an environmental impact statement that has been submitted to the Environmental Protection Agency or the Office of Environmental Quality Control and evaluate its adequacy.	SS, Sc

INSTRUCTIONAL GOAL F:

Students will examine optional courses of action and their consequences for improving the quality of life and will support those that will provide optimum short- and long-term benefits for society and the environment.

SUGGESTED GRADE LEVEL		INSTRUCTIONAL OBJECTIVES: Provided with the necessary experiences, data and information, students will:	SUGGESTED SUBJECT AREAS
K-3	1.	demonstrate by group and individual action that classmates' rights must be respected.	SS, PE, V
K-3	2.	show by behavior that private ownership is respected.	SS, V
K-3	3.	explain why they feel the basic needs of life should also include truth, beauty, justice, love and faith. (Give examples of how each person may contribute to each of the above.)	SS, Sc, Art, Music, V
K-3	4.	give examples of situations in the home or community which provide comfort for various members of the family.	SS, Sc
K-3	5.	differentiate between housing in the community which seems to be adequate and housing which is not.	SS, Sc
K-3	6.	develop individual, class or community "action" projects that will improve the community environment. Some suggestions include: anti-litter drives, using both sides of a piece of paper, a classroom flower garden, picking up trash in the school yard or around the neighborhood.	SS, Sc, LA, Student Act.
K-3	7.	"plan" a community which provides for homes, work, food, water, waste disposal, and recreation using a sand table, diagram, or a bulletin board.	Sc, SS, H, N
K-3	8.	show, through dramatization by puppets, the results of careless planning of a classroom, school or community.	LA, SS, H, Art, Music, N
K-3	9.	differentiate between good and bad land use from pictures or experiences.	LA, SS, PE
K-3	10.	suggest ways to better care for land in the community.	SS, Sc, H, PE
K-3	11.	suggest reasons wildflowers should be preserved for others to enjoy.	SS, Sc, Art, V

K-3	12.	list and discuss sounds which the student likes or dislikes.	Sc, H, Music, V
4-6	13.	observe people in crowded situations and report how their behavior changes.	SS, Sc, H
4-6	14.	suggest ways people may be influenced to more completely appreciate and protect their environment.	SS, Sc, PE, Art, Music, V
4-6	15.	plan and promote ways to develop individual and community spirit in highly polluted areas.	SS, H, Art, Music, V, Student Act
4-6	16.	demonstrate the difference between people's needs and wants that are not essential to life by dramatization, role playing, or other methods.	Sc, H, LA, SS, V, N
4-6	17.	observe and identify types of pollution that affect the quality of life.	Sc, SS, H, Art, Music, N
4-6	18.	group sounds from several locations as natural or human-made, pleasant or unpleasant.	Sc, H, Music
4-6	19.	identify noise pollution sources in the school community.	SS, H, Sc, Music
4-6	20.	make a musical presentation representing a particular type of environment or a component of an environment.	Music
4-6	21.	identify components of a familiar environment from their characteristic sounds.	Music
4-6	22.	discuss the results noise pollution may have on people if it is not controlled.	SS, H, Music, Sc, C
4-6	23.	demonstrate ways noise interferes with learning ability.	Sc, SS, H
4-6	24.	design and demonstrate a system for measuring the intensity of sound.	Sc, H, Music
4-6	25.	propose feasible solutions to noise pollution problems in the community.	Sc, H, SS
4-6	26.	observe and describe the steps that are necessary to produce potable water at the faucet in the home.	Sc, SS, H
4-6	27.	give examples of how technology and proper management have restored land.	Sc, SS, C
4-6	28.	commend those responsible for improving environmental quality. (Techniques: poetry, letters, songs, stories, individual actions.)	LA, Art, Music, V

4-6	29.	describe how highways affect the use of land and discuss the aesthetic, economic and other effects of such changes.	LA, SS, Sc, Art, Music, C
4-6	30.	develop a transportation plan for the community to alleviate many of its pollution and safety problems.	SS, H, C
4-6	31.	identify recreation areas in the community which may soon be unusable because of improper use, development, size or contamination.	H, Sc, SS, PE
4-6	32.	identify local practices which affect the beauty of the community.	Sc, SS, H, Art, HS
4-6	33.	explain why beauty and recreation are important in human leisure time activities.	SS, H, Sc, Art, PE, Music
4-6	34.	develop a photographic essay to show how people have capitalized on nature's beauty.	LA, PE, Art, Student Act
4-6	35.	give examples of steps which might be taken to prevent or minimize pollution by some of the following: self, family, neighborhood, industry, towns, cities, counties, states, federal government, United Nations, nations of the world.	Sc, SS, H, C, V
4-6	36.	list the uses and abuses of natural resources observed during a recent field trip.	LA, H, Sc, SS, C
4-6	37.	survey the community to determine attitudes of individuals, farmers, businessmen or others about pollution control.	SS, H, Sc, C, V
4-6	38.	discuss reasons why laws have been established to reduce pollution, protect wildlife, protect plants, or protect the environment in some way.	SS, H, Sc, V
4-6	39.	discuss whether new laws, a concerned citizenry and new technology will enable humans to maintain a livable environment.	H, SS, Sc, V
4-6	40.	write a dialogue or play to illustrate how culture affects values and attitudes about the environment using examples like frontiersmen, Indians, farmers, city dwellers, and Hawaiians before and after 1778.	LA, SS, V, HS
7-9	41.	observe and report on persons who promote love, comfort, understanding and a positive self-concept.	SS, Sc, AEP, V
7-9	42.	investigate factors influencing humans' attitudes toward the environment and explain how people express these attitudes through many forms of communication. (Consider verbal and nonverbal.)	SS, LA, Music, Art, AEP, PE, V

7-9	43.	observe and report on ways in which people's actions have affected or violated the rights of others.	LA, SS, Sc, PE, AEP, C
7-9	44.	evaluate local community zoning regulations in terms of their effects on the quality of life.	SS, H, C
7-9	45.	react to the following situation: A person with a small farm on the edge of town cannot raise enough food to feed cows and cannot buy more land. What should be done and why?	Sc, SS, AEP, V
7-9	46.	discuss environmental conditions which encourage people to improve their lives.	SS, H, Art, Music, PE, V, C
7-9	47.	predict future living problems in large cities if long-range planning does not provide adequately for the humanistic needs of all people.	SS, H, Sc, LA, PE, Art, Music, C
7-9	48.	propose a flexible plan for community development which provides for human needs.	SS, H, Sc, PE, Art, Music, C
7-9	49.	write and present a program illustrating how continuance of present human life styles will affect the quality of life.	SS, H, Sc, LA, PE, V, C, N
7-9	50.	describe the adequacy of emission controls (smoke, fumes, solids, liquids) at one community industrial site based on data obtained by systematic observation.	SS, Sc, H, C
7-9	51.	present data on how industrialization may positively and negatively affect areas.	SS, H, Sc, C
7-9	52.	inventory community recreational activities and predict the future of each based upon current environmental practices. (Example: polluted lakes, misused parks, local population trends).	SS, H, Sc, PE, C
7-9	53.	discuss whether science, law, technology and money will be able to solve environmental problems without also changing people's values and attitudes.	SS, H, Sc, M
7-9	54.	propose and implement a system for recognizing businesses which employ good environmental practices.	LA, SS, V, C, Student Act
7-9	55.	calculate water yield and water consumption for the county and relate this to projected water needs.	H, M, Sc, SS
7-9	56.	compare the quality of local surface water with rain water.	H, Sc
7-9	57.	study various types of flood plain usage and differentiate between good and poor uses.	SS, H, Sc

7-9	58.	relate land drainage practices to water supply, wildlife needs and CO_2-O_2 balance in the atmosphere.	Sc, H
7-9	59.	identify factors which cause lake eutrophication and suggest practices which will slow the process.	SS, Sc, H, C
7-9	60.	compare the organisms living in fresh bodies of water with those in water undergoing eutrophication.	Sc, H
7-9	61.	conduct a study to determine the environmental impact of power boats, jet skis, hydrofoils, or hovercraft on a body of water.	SS, H, Sc, C
7-9	62.	research environmental implications of using colored paper products.	H, Sc
7-9	63.	evaluate the adequacy of the local sewage treatment facility.	SS, Sc, H, C
7-9	64.	calculate the cost (per user) of adding tertiary sewage treatment for a nearby city and debate a resolution for such installation.	M, H, Sc
7-9	65.	discuss current federal, state and local laws which affect the community's method of sewage treatment.	Sc, SS, H
7-9	66.	discuss economic and ecological reasons for future utilization of sea water.	SS, Sc, H, AEP, C
7-9	67.	analyze the merits of various modes of transportation that might be used in an urban area and propose a transportation plan for the community.	SS, Sc, C
7-9	68.	debate the resolution: "Billboard signs should be banned in all states."	LA, SS, V
7-9	69.	evaluate "environmentalists" demand for anti-pollution devices in automobiles.	SS, H, Sc
7-9	70.	test a plant's ability to grow in polluted air such as near a factory or traffic congested area.	Sc
7-9	71.	gather data about respiratory illnesses, cancers, or birth defects among people living in an area or in a particular occupation and develop a hypothesis about the cause of these problems.	H, Sc, C, N, LS

7-9	72.	design a land use plan for the town or community which will maximize the quality of life.	SS, PE, Art, H, Sc, Music, V
7-9	73.	choose an occupation of interest and write a brief report explaining this choice and its potential relation to the quality of life.	SS, LA. C, LS
7-9	74.	express opinions, using various media, on how increased leisure time has influenced change in land use in the community, county or state.	LA, SS, Sc, H, PE
7-9	75.	evaluate five new products seen advertised recently on television in terms of their potential impact on the environment and human life.	LA, Sc, N
7-9	76.	describe problems which may occur if a community of 3,000 were to grow rapidly to 50,000 without land use planning.	H, Sc, LA, SS, PE, Art, M, N
7-9	77.	list and evaluate four government activities aimed at improving health.	SS, Sc, H, N, C
7-9	78.	describe various industries which seem to be ecologically sound and evaluate the possibilities of these industries existing in Hawaii.	SS, Sc, H, C, N
7-9	79.	describe life styles which they feel are ecologically sound.	SS, Sc, LA, V
7-9	80.	evaluate the merits of the statement: "Bigger is not necessarily better, slower can be faster, and less can be more."	SS, LA, V
7-9	81.	identify animals which have adapted and proliferated as a result of urbanization.	Sc, SS
7-9	82.	use an art form to depict leisure time activities which contribute to environmental stresses.	SS, PE, Art, Music, LA
10-12	83.	prepare a presentation depicting the life of young people and adults from another segment of society.	LA, SS, HS, LS
10-12	84. A.	report on psychological and sociological stresses in urban areas.	H, Sc, SS, V, LS, N
	B.	report on the advantages of living in metropolitan centers.	H, Sc, SS, LS
	C.	prepare a report suggesting ways to improve the quality of life in urban areas.	SS, Sc, H, LA, PE, Art, C, LS, N
10-12	85.	evaluate various fashions and modes of dress in terms of their environmental impact, e.g., recycling of materials, energy used in production, heating and ventilation of building, and write a dress code for school which is practical, ecological and implementable.	H Ec, SS, H, Sc, M

10-12	86.	evaluate various recreational activities in terms of their environmental impact on air, water, soil, plants, and animals.	PE, Sc
10-12	87.	identify and explain the conditions in the community which have affected its productivity and/or livability.	H, SS, Sc, Bus, PE, Art, C
10-12	88.	gather data which shows that the availability of natural resources greatly affects the quality of life.	Sc, H, SS, C, LS
10-12	89.	develop a presentation describing what the community would be like with the removal of one resource.	LA, H, SS, Sc, C
10-12	90.	prepare an editorial about a community problem.	LA, SS, H, N
10-12	91.	research and prepare a movie or videotape which explains a local ecological problem.	LA, Sc, H, Art, Student Act, LS
10-12	92.	develop a display or other presentation which depicts life style changes in the community during this century.	LA, SS, Art, HS, N
10-12	93.	suggest where the centers of American culture, industries, and agriculture would be if the United States had been settled from West to East.	SS, LA, C
10-12	94.	analyze and report on societal factors which affect attitudes and values.	LA, SS, V, C, N
10-12	95.	design a program to correct a local environmental problem.	SS, H, Sc, LA, V
10-12	96.	assess zoning regulations in terms of environmental considerations.	SS, H, B, Agri
10-12	97.	develop an inventory and construct a map of a downtown area showing streams, parks, wildlife areas, aesthetic areas, trees and other interesting natural features.	CA, SS, Art
10-12	98. A.	survey the community to determine usage of local parks.	H, PE, SS, LA
	B.	suggest a plan for improving the quality of park utilization.	H, PE, SS, LA
10-12	99.	collect data on human behavior relevant to the solution of a city's traffic problems.	SS, H, Sc, V
10-12	100.	design a restoration plan for a city based on humanistic considerations.	SS, LA, H, PE, Art, V

10-12	101.	prepare a traffic plan for the city which provides for the reduction of problems of traffic congestion, noise, and parking.	SS, H, LA, M
10-12	102.	suggest ways shopping center parking lots can be constructed to better utilize the natural environment.	SS, Bus, Art, M
10-12	103. A.	plan an audiovisual experience depicting various (visual) aesthetic characteristics of the community.	SS, LA, Art, V
	B.	suggest a plan for improving or maintaining the aesthetics of the community.	LA, SS, Sc, Art, Music, V
10-12	104.	develop a documentary on the necessity of including environmental impact considerations in making all public and/or private decisions.	SS, H, LA, Sc, C, V, LS
10-12	105.	react objectively to: "A country must constantly increase its Gross National Product to prosper."	Bus, SS, LA, C, M
10-12	106. A.	identify a business or industry which employs a large number of people but whose operations causes considerable damage to the local and/or downstream, downwind, or coastal environment.	SS, H, Bus, Sc, C
	B.	prepare a report outlining the economic, political and ethical considerations which the board of directors of the above organization must evaluate in arriving at a decision to either close the plant or massively invest in additional pollution control devices.	SS, H, Bus, LA, C, V, LS
10-12	107.	debate the issue: "An industrial company should voluntarily install pollution control devices in the absence of industry-wide regulations or agreements on emission levels."	Bus, Sc, H, SS, LA, C
10-12	108. A.	formulate a plan for the location and construction of needed major industries, utilities or public installations in the community.	SS, H, Bus, Sc, C
	B.	develop an environmental impact statement for one of the installations.	SS, H, Bus, Sc, LA
10-12	109.	secure a copy of an environmental impact statement that has been submitted to the Environmental Protection Agency or Office of Environmental Quality Control and evaluate its completeness.	SS, Sc
10-12	110.	assess the environmental impact practices of local, state and federal highway agencies.	SS, H, Sc

10-12	111.		select a nearby construction project (a highway, houses, a school) and determine whether the contractor and/or developer is adequately providing for the maintenance of the environment during the period of construction.	SS, Bus, Sc, C
10-12	112.		identify roles which governments, institutions, and organizations can logically assume in repairing environmental damages.	SS, H, Bus, C
10-12	113.		debate the issue: "The solution of environmental problems is the sole responsibility of science and technology."	Bus, LA, SS, Sc
10-12	114.		project the effect of proposed nuclear power plants on water quality and usage if construction plans do not include thermal and pollution control devices.	H, SS, Sc, M
10-12	115.		explain the economic, health and ecological implications of such city practices like street flushing, salting, or cleaning.	H, SS, Sc, M
10-12	116.	A.	identify problems resulting from chemical, insect and weed control.	H, SS, Sc, Ag
		B.	suggest workable alternatives to chemical controls which will provide for an adequate food supply.	H, Sc, Bus, Ag
10-12	117.		identify problems resulting from intensified agricultural production such as feed lots and enriched fertilizer.	Ag, H, Sc, N
10-12	118.		map and explain why the development and location of America's largest cities depend on an adequate supply of usable water.	SS, H, Bus, C, N
10-12	119.		predict the future of all forms of life if the nation's waters are increasingly polluted by an increasing population and water treatment does not keep pace with the population's demand for water.	H, SS, Sc
10-12	120.		compare dollars needed for cleaning up waterways to the current local, state and federal appropriations and assess which components of these funds need to be increased.	SS, H, Sc, M
10-12	121.		list effects of polluted air on life.	SS, H, Bus, Sc
10-12	122.		relate the "Green House" effect to weather change.	Sc, H
10-12	123.		document that air pollution is a direct effect of industrialization in developing societies.	Bus, H, SS, Sc, C

10-12	124.	construct the conditional situation which would encourage industries and utilities to improve their air quality.	SS, Bus, C, V, M
10-12	125.	acquire and study current air pollution legislation.	SS, H, Sc, Bus
10-12	126.	monitor air quality in various areas and map areas of high pollution.	Sc, SS, M, H
10-12	127.	analyze and report on the environmental trade-off involved in the nitrogen cycle, e.g., consider providing adequate protein diets vs. water nitrification.	Sc, H, SS, H Ec, Ag, N
10-12	128.	secure and test foods for insecticide or pesticide contamination.	Sc, H, H Ec, Ag, N
10-12	129.	contrast an early colonist's or Hawaiian's value system with that of ours today in terms of land and resource use.	SS, Bus, Ag HS, V, N
10-12	130.	investigate religious and non-religious historical figures to discover the effects of religion on human attitudes and values toward the environment.	SS, LA, AEP, V, LS
10-12	131.	interpret personal feelings toward humans and the environment by means of a collage, poem or skit.	LA, Sc, SS, Art, Music, AEP, V
10-12	132.	write a paper describing relationships between human cultural, social or economic experiences and their attitudes and values toward the environment.	LA, SS, Bus, AEP, V, C
10-12	133.	give examples of short-term gains that may well become long-term losses.	SS, Bus, H, Sc, C
10-12	134.	write a paper or give a speech illustrating the environment ramifications of Pogo's statement: "We have met the enemy and he is us."	SS, LA, H, Sc
10-12	135.	evaluate various life styles and value systems existing in the community, nation and the world in terms of providing optimum short-term and long-term benefits for self, society and the environment.	Sc, SS, H Ec, Bus, Art, Music, PE, LA, AEP, V, M, N

Performance Expectations -- Instructional Goals and Objectives Match

The numbers in the columns under instructional goals refer to instructional objectives in grades K-3

Grade 3 Performance Expectations	Instructional Goals A	B	C	D	E	F
•Cites examples of local environmental problems.	1,3,4	4,5,25,26				
•Identifies causes of local environmental problems.	2	7,11	1,2,3,5			
•Cites examples of statewide, nationwide or worldwide environmental problems.		6,13				
•Identifies a variety of resources that may be used to gain information on environmental matters.*						
•Uses a variety of resources to gain information on environmental matters.		24,30			9,10,11,13,14, 17,20	9
•Conducts simple investigations to gain first-hand information on environmental matters.		8,12,20,21,23, 27,28,29	3,6,9	3,4,5,7	3,5,6,7,8,11, 12,13,14,16,18	9
•Identifies recreational opportunities in both human-made and natural environments.		6,19		2,6		4
•Describes the environmental factors which must be considered to conduct various recreational activities.		14		6		9
•Names occupations in the community that are directly dependent on various natural resources.					2	
•Describes the natural resources needed by various industries and relates the locations of those industries to available resources.	3	9,25			1	
•Cites examples of occupations that are primarily concerned with the study or control of specific environments.					2	

*Most, if not all, instructional objectives demand the use of various resources; therefore, the listing of individual instructional objectives has been deleted.

The numbers in the columns under instructional goals refer to instructional objectives in grades K-3

Grade 3 Performance Expectations	Instructional Goals A	B	C	D	E	F
·States school or home rules designed to protect the environment.						1,2
·Discusses the effectiveness of school or home rules designed to protect the environment.						1,2
·Explains the need for rules to protect the environment.						1,2
·Communicates feelings evoked by various types of environments.		2,10,15		1	15	12
·Describes the need for beauty in one's environment.				1,2		11
·Lists a number of environmental factors which may affect the emotional or physical health of human beings.		1,3,4,5,13,17, 18,19,22,25	2		4,17,19	3,4,5,7,8
·Discusses attitudes which contribute toward living in harmony with the environment.		14	1,4,7,8		12,15	3,4,6,10

The numbers in the columns under instructional goals refer to instructional objectives in grades 4-6

Grade 6 Performance Expectations	Instructional Goals A	B	C	D	E	F
Identifies causes of local environmental problems.		31,34,61,77,78,87,89			22	17,36
·Cites examples of statewide, nationwide environmental problems.	6,8	30,53,62, 72, 87				17
·Cites examples of social, political, or economic decisions which have caused environmental problems.	7,8	79,80,83				16,29
·Identifies a variety of resources that may be used to gain information on environmental matters.		67	11			
·Uses a variety of resources to gain information on environmental matters.		38,41,44,67, 75,76,83,93	14,16	8,11,14,16,18	25,26,27,28, 29,30,31,33, 34	18,21
·Conducts simple investigations to gain first-hand information on environmental matters.		42,43,47,51, 52,54,56		12,13,17,21	24	24,26
·Identifies instruments or methods that can be used to gain information about environments or to change an environment for a desired result.	9	47,51,55,58,67, 93		21	24,27,29,32, 39	24,27,39
·Identifies recreational opportunities in both human-made and natural environments.		46		1		31,33
·Describes the environmental factors which must be considered to conduct various recreational activities.		46,48,82		15		31
·Explains the effects of environmental changes on recreational opportunities.		46,82		15		31
·Explains the potential effects of changes in recreational activity on the environment.		48,79				31

The numbers in the columns under instructional goals refer to instructional objectives in grades 4-6

Grade 6 Performance Expectations	Instructional Goals A	B	C	D	E	F
·Names industries that are directly dependent on a natural resources.	7	30,35,36,37,75, 76,91,92				
·Describes the natural resources needed by various industries and relates the locations of those industries to available resources.	7	35,36,37,38,76, 91,92				
·Cites examples of occupations that are primarily concerned with the study or control of specific environments.		35,46,79,80				
·Describes the impact of various industries on the environments.	6,8	36,38,78,92				36
·Discusses the effectiveness of school or home rules designed to protect the environment.		39,50,57,64, 70,73,86				
·Explains the need for rules to protect the environment.		39,50,57,64, 70,73,86				35,38,39
·Identifies state and federal government agencies primarily concerned with environmental management or control.		46,50,57,64, 70,73,86, 73	11			35 35
·Identifies non-governmental groups primarily concerned with environmental matters.						
·Communicates feelings evoked by various types of environments.		41,72,84				19,20
·Describes the need for beauty in one's environment.		68,72,84				19,20,32,33, 34
·Volunteers for school beautification projects.						15
·Lists a number of environmental factors which may affect the emotional or physical health of human beings.		32,33,44,45,56, 59,63,66,68,84, 88	17	9,10,16,19	22,23,33,37, 38	13,16,22
·Discusses attitudes which contribute toward living in harmony with the environment.		40	10,15,18,19		21	14,15,37,39
·Cites examples of negative and positive ways human beings can change the environment.	6	31,40,46,48,49, 55,61,69,71,74, 81,85,87,89,90	12,13,14,17,18		35,36	25,29,30,35 39

The numbers in the columns under instructional goals refer to instructional objectives in grades 4-6

Grade 6 Performance Expectations	Instructional Goals A	B	C	D	E	F
·Identifies and describes environmental factors which influence the beliefs of different cultures.	10	32,37				14,17,40
·Identifies specific contributions one can make to help human beings live in harmony with the environment.	9	34,40,48,60,61, 69,71,74	12,21		21	14,15,25,28, 30,35
·Describes the effects of environmental changes on the beauty of an environment.		63,68	17			,22,29,32, 34
·Explains how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.		34,44,45,63, 66,68,88,89		10,16,19,20	22,33,38	13,16,17,22, 23
·Accepts leadership role in school beautification projects.			14,19			15,25,28

The numbers in the columns under instructional goals refer to instructional objectives in grades 7-9

Grade 8 Performance Expectations	Instructional Goals A	B	C	D	E	F
·Cites examples of statewide, nationwide or worldwide environmental problems.	23,25	135		23	53,60	
·Cites examples of social, political, or economic decisions which have caused environmental problems.	23,26	135,136		23		
·Describes the interrelationship of the social, political, and economic structures and environments of different societies.		139,140,141, 142,143		23,33,34		
·Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.	14,15	113	30		52	
·Predicts the effects social, political, and economic changes would have on the environment.	13	144,146		22,34,35, 37, 38		76
·Uses a variety of resources to gain information on environmental matters.	16,27,28	98,108,109,110, 112,115,125, 132,136		24	40,46,50,58, 62,65,66	71
·Conducts simple investigations to gain first-hand information on environmental matters.		103,108,114			45,48,61	50,55,56,70, 71
·Describes instruments or methods that can be used to gain information about environments or change an environment for a desired result.		101,103	27,28		45	
·Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.	11,16,17,18,21, 22,24,26,27,28, 29	94,95,96,99, 100,101,106, 107,108,109, 110,112,113, 114,115,116, 117,120,121, 123,124,129, 130,134,137, 138,144,147, 148,149,150	22,23,24,25,29, 33,35,38	26,27,28,32,34, 35,36,41,42	41,42,43,44, 47,49,50,51, 53,54,55,58, 63,69,70	53,57,58,59, 60,63,64,66, 67,69,75,81

The numbers in the columns under instructional goals refer to instructional objectives in grades 7-9

Grade 8 Performance Expectations	Instructional Goals A	B	C	D	E	F
·Describes the environmental factors which must be considered to conduct various recreational actitivites.		101,111,152				52,82
·Explains the effects of environmental changes on recreational opportunities.		101,146,152		22		52
·Explains the potential effects of changes in recreational activity on the environment.		101,111,146, 152				52,61,74,76, 82
·Suggests ways the environment may be improved to provide more recreational opportunities.		152				
·Describes the natural resources needed by various industries and relates the locations of those industries to available resources.		126,151	21		59	78
·Cites examples of occupations that are primarily concerned with the study or control of specific environments.						54,73
·Describes the impact of various industries on the environment.		127,136, 149	31		56,59	50,51,54,61, 62,69,73,75, 78
·Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries' impact on the environment.		127,136,151	21		59	51,69,73,75, 78
·Identifies state and federal government agencies primarily concerned with environmental management or control.			33,34	26	57	73,77
·Identifies non-government groups primarily concerned with environmental matters.					57	73

The numbers in the columns under instructional goals refer to instructional objectives in grades 7-9

Grade 8 Performance Expectations	Instructional Goals A	B	C	D	E	F
·Describes responsibilities of state and federal agencies for environmental management or control.			33,34	26	57	73,77
·Describes the functions of non-governmental groups concerned with environmental matters.					57	73
·Identifies state or federal laws designed to protect people and the environment and discusses their effectiveness.		105	32	26	57	65
·Volunteers for school beautification projects.		102				
·Lists a number of environmental factors which may affect the emotional or physical health of human beings.		25,122,127		25,31		71
·Discusses attitudes which contribute towards living in harmony with the environment.	19,20	99,104,118,119, 144,145,146	27,28	43	64,68	41,42,43,79, 80
·Cites examples of negative and positive ways human beings can change the environment.	15,28	97,101,104,116, 118,119,146	27,28	29,39	52,56,57,60, 64,68	41,43,46,49, 69,79,80
·Identifies and describes environmental factors which influence the beliefs of different cultures.		122		37,43		46,76
·Identifies specific contributions one can make to help human beings live in harmony with the environment.	12,14,15,19,20, 21	97,101,104,118, 119,144,145, 146			57	
·Describes the effects of environmental changes on the beauty of the environment.		100		22,39,40	67,68	46,68,72
·Explains how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.		122,127,130, 133,137		25,31		44,45,46,47, 69,71,76
·Predicts the effects of continuing environmental changes on the beauty of environment.		146		23,38	67,68	47,49,72

The numbers in the columns under instructional goals refer to instructional objectives in grades 7-9

Grade 8 Performance Expectations	Instructional Goals A	B	C	D	E	F
·Compares the aesthetic value of maintaining natural environments with the need for housing, improved transportation facilities, and increased employment oportunities.		114		29,30		44,45,47, 67,72,76
·Investigates community or state beautification projects and encourages class participation.		104				
·Suggests ways the environment may be improved to promote better emotional and physical health for human beings. ·Accepts leadership role in school beautification projects.*		104,133				46,48,72

* Several instructional objectives relate to this Performance Expectation but none directly since it illustrates a high level of attainment and is very specific.

The numbers in the columns under instructional goals refer to instructional objectives in grades 10-12

Grade 10 Performance Expectations	Instructional Goals A	B	C	D	E	F
·Cites examples of social, political, or economic decisions which have caused environmental problems.	31,32	154		59	86	90,91,104, 117,123
·Describes the interrelationships of the social, political, and economic structures and environments of different societies.	31	157,165	38	49,54,57	76,78,90	88,89,90, 91,92,93, 94,106,123, 129,132,135
·Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.	31,32,33,34	154,157,158, 160,164,169		49,51,58,59		104,105,108, 109,116,117, 120,121,124, 133
·Predicts the effects social, political, and economic changes would have on the environment.		157,158,164, 167		48,55		105,114,119, 132,135
·Selects an environmental problem, investigates alternate solutions to that problem, selects one alternative and defends that selection by identifying the benefits and consequences of that decision to the environment and to society.	31,34	158,160,172		60		95
·Describes instruments or methods that can be used to gain information about environments or change an environment for a desired result.		158,159,160, 171,172	36,49		89	95,98,100, 101,102,103, 108,116
·Uses a variety of instruments or methods to study or change environments.			36,49	46,61	74,81,91	97,98,99, 109,118, 126,128
·Synthesizes environmental knowledge to suggest new instruments or methods which may reasonably be developed to study or change an environment.			36,52			98,113

The numbers in the columns under instructional goals refer to instructional objectives in grades 10-12

Grade 10 Performance Expectations	Instructional Goals A	B	C	D	E	F
· Describes the types of training necessary for various occupations dealing with the environment.		177,181				
· Describes responsibilities of state and federal agencies for environmental management or control.		153,155	42			112
· Describes the functions of non-governmental groups concerned with environmental matters.		156				112
· Identifies federal or state laws designed to protect people and the environment and discusses their effectiveness.		178	42		76	125
· Identifies worldwide organizations concerned with environmental matters.		153,155,156		45	90	11[illegible]
· Cites examples of negative and positive ways human beings can change the environment.	31, 32, 34	154, 156, 157, 160, 161, 162, 163, 164, 166, 168, 169, 174, 175, 177, 179	36, 37, 41, 46	49, 50, 51, 52, 57, 58, 59, 61, 62	73, 74, 75, 82, 83, 91	84, 85, 90, 96, 98, 99, 100, 102, 103, 107, 108, 109, 110, 111, 112, 113, 115, 116, 121
· Identifies and describes environmental factors which influence the beliefs of different cultures.	31	157, 180, 181	40	57	71, 76	87, 88, 89, 92, 93, 105, 118, 119, 129
· Identifies specific contributions one can make to help human beings live in harmony with the environment.		171,172,176, 178	50			
· Describes the effects of environmental changes on the beauty of an environment.		160,166	48		75	87,97,103
· Explains how environmental factors such as noise level or air quality may affect the emotional and physical health of human beings.			40,41,51			
· Predicts the effects of continuing environmental changes on the beauty of the environment.		162,166,170		55		
· Compares the aesthetic value of maintaining natural environments with the need for housing, improved transportation, and increased employment opportunities.		162		44,49		87,103,107, 110,129

The numbers in the columns under instructional goals refer to instructional objectives in grades 10-12

Grade 10 Performance Expectations	Instructional Goals A	B	C	D	E	F
· Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.	30,31,33,34	159,161,163, 165,166,168, 169,174,175	36,37,38,39,41, 45,46,47,48,51	44,45,46,48,49, 50,51,52,53,54, 55,56,57,58,59, 60	71,72,73,75,77, 78,79,80,85,86, 87,88,89,91	83,87,88, 90,91,92, 93,95,104, 107,108, 109,110, 112,113, 115,116, 117,119, 120,121, 126,128, 129,130, 132,133
· Demonstrates an interest in the environment by seeking knowledge about the environment through voluntary attendance at environmental lectures, selecting elective classes in environmental studies, or by joining organizations concerned with environmental matters.		166,178			71	90
· Explains the effects of environmental changes on recreational opportunities.						114,119
· Explains the potential effects of changes in recreational activity on the environment.						86,91,98
· Suggests ways the environment may be improved to provide more recreational opportunities.					84	84,97,100
· Describes the impact of various industries on the environment.						87,106,107, 108,111, 117
· Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries' impact on the environment.		173,180,181				87,106,107, 108,123

The numbers in the columns under instructional goals refer to instructional objectives in grades 10-12

Grade 10 Performance Expectations	Instructional Goals A	B	C	D	E	F
·Investigates community or state beautification projects and encourages class participation.		176				
·Describes ways human-made environments can be designed to harmonize with natural environments.		162	44			85,87,96, 98,100, 101,102, 103,108
·Suggests ways that the environment may be improved to promote better emotional and physical health for human beings.		162,170	36,38,40,50, 52	49,59	82,83,84	84,98,101, 115
·Evaluates the effects of community or state beautification projects.		176	39,40			115
·Makes improvement in home, school, or community environments to promote better emotional and physical health.		170,171,172	43,44			85

The numbers in the columns under instructional goals refer to instructional objectives in grades 10-12

Grade 12 Performance Expectations	Instructional Goals A	B	C	D	E	F
·Selects an environmental problem, studies the various aspects of that problem, and suggests a variety of solutions to that problem including an explanation of the possible impact of each solution.	31,32,33,34	154,157,158, 160,164,169		49,51,58,59		104,105, 108,109, 116,117, 120,121, 122,133
·Predicts the effects social, political, and economic changes could have on the environment.		157,158,164, 167		48,55		105,114, 119,132, 135
·Selects an environmental problem, investigates alternate solutions to that problem, selects one alternative and defends that selection by identifying the benefits of that decision to the environment and to society.	31,34	158,160,172		60		95
·Demonstrates concern about the environment by attending lectures, taking classes outside of the regular school program, writing articles for various publications on environmental matters or by joining an ecology group.		166,178			71	90
·Organizes a special interest group to work towards solving an environmental problem.						95
·Uses a variety of instruments or methods to study or to change environments.			36,49	46,61	74,81,91	97,98,99, 107,108, 126,128
·Synthesizes environmental knowledge to suggest new instruments or methods which may reasonably be developed to study or change an environment.			36,52			98,113

The numbers in the columns under instructional goals refer to instructional objectives in grades 10-12

Grade 12 Performance Expectations	Instructional Goals A	B	C	D	E	F
·Integrates information gained from resources with information gained through direct experiences to develop understanding of environmental matters.	30,31,33,34	159,165,166, 168,169,174, 175	36,37,38,39, 41,45,46,47, 48,51	44,45,46,48, 49,50,51,52, 53,54,55,56, 57,58,59,60	71,72,73,75, 77,78,79,80, 85,86,87,88, 89,91	83,88,89, 91,92,93, 94,96,105, 108,109, 110,111, 113,114, 115,117, 118,120 121,122, 127,128, 130,131, 132,134
·Demonstrates an interest in the environment by seeking knowledge about the environment through voluntary attendance of environmental lectures, selecting elective classes in environmental studies or by joining organizations concerned with environmental matters.*						
·Suggests ways the environment may be improved to provide more recreational opportunities.						84,98,100
·Describes the problems of industries that have been deeply affected by changes in natural environments or social reactions to those industries' impact on the environment.		173,180,181				87,106,107, 108,123
·Describes the types of training necessary for various occupations dealing with the environment.		177,181				
·Predicts occupations which may be created or abolished due to emerging environmental concerns.		158,166,167, 168,177,180, 181				106,107

*An outcome of a variety of classroom activities, not directly related to an instructional objective.

The numbers in the columns under instructional goals refer to instructional objectives in grades 10-12

Grade 12 Performance Expectations	Instructional Goals A	B	C	D	E	F
·Identifies federal or state laws designed to protect people and the environment and discusses their effectiveness.		178	42		76	125
·Identifies worldwide organizations concerned with the environmental matters.		153,155,156		45	90	112
·Describes the functions of worldwide organizations concerned with environmental matters.		153,155,156		45,47	90	112
·Analyzes the influences of various groups, individuals, and governmental orgaizations in making decisions on environmental matters.		155,156,178, 179		44,45,47	90	94,112, 135
·Predicts the effects of continuing environmental changes on the beauty of the environment.		162,166,170		55		
·Compares the aesthetic value of maintaining natural environments with the need for housing, improved transportation, and increased employment opportunities.		162		44,49		87,103,107, 110,129
Investigates community or state beautification projects and encourages class participation.		176				
·Describes ways human-made environments can be designed to harmonize with natural environments.		162	44			84,87,96, 98,100,101, 102,103,108
·Suggests ways the environment may be improved to promote better emotional and physical health for human beings.		162,170	36,38,40,50, 52	49,59	82,83,84	84,98,101, 115
·Evaluates the effects of community or state beautification projects.		176	39,40			115
·Makes improvement in home, school, or community environments to promote better emotional and physical health.		170,171,172	43,44			85
·Participates in school or community campaigns to provide an environment which promotes better physical and emotional health.		170,171	43			85

APPENDIX

FUNDAMENTALS ABOUT THE ENVIRONMENT AND HUMANS' RELATION TO THE ENVIRONMENT

To understand the major environmental education concepts and to be able to address environmental issues and problems, knowledge of the fundamentals about the environment and humans' relation to that environment is necessary. The following section is included in this guide to help teachers and administrators strengthen their understanding of environmental education. Material in this section was taken from Fundamentals of Environmental Education, Report of the Subcommittee on Environmental Education, Federal Interagency Committee on Education, U. S. Dept. of Health, Education, and Welfare, Nov. 1976.

SECTION I. Fundamentals About Earth's Environment

A. Earth's environment is a whole.

B. The ecosphere is a dynamic, constantly changing macro-system--a mosaic of ecosystems.

C. The energy and materials necessary for all life are components of each ecosystem.

D. Each ecosystem includes a number of species populations.

* * *

A. Earth's environment is a whole.

1. The natural conditions on Earth that support the development and maintenance of ecosystems are a function of Earth's place in the solar system and the structure of Earth.

   a. Solar energy is the primary source of energy for all the physical, chemical and biochemical cycles and other processes occurring on Earth. Secondary sources of energy include nuclear processes, tidal, gravitational, and geothermal sources.

   b. Earth absorbs energy from the sun and radiates energy into space. It is in a state of overall energy balance.

   c. The influx and distribution of solar energy gives rise to the climates that prevail on Earth. It powers the movement of global air masses, the hydrologic cycle, ocean currents. It provides conditions essential to the life on Earth.

2. Earth's environment constitutes a complex interrelated, interactive life support system called the "ecosphere".

B. The ecosphere is a dynamic, constantly changing macro-system--a mosaic of ecosystems.

1. The ecosphere is composed of interacting systems called ecosystems.

a. An ecosystem is a recognizable, homogeneous unit of the ecosphere and exists at a particular point in space and time. Each ecosystem consists of three groups of components: (1) physical factors (sun's energy, climate, rocks, water, etc.); (2) living organisms, including humans; and (3) interactions among and/or between living and nonliving components (competition, erosion, decomposition, etc).

b. Each ecosystem has "system" characteristics that derive from the interactions of the system's components and differ from the characteristics of individual components. Therefore, the system functions in ways that cannot be understood by studying only its parts.

c. Ecosystem processes are limited by such physiochemical attributes as the availability of energy, materials, space, time, and the inherited characteristics of organisms.

d. The characteristics of each individual organism depend upon interactions of its genetic composition with its total environment.

e. These characteristics fit each population to function in particular roles known as "niches." Populations are interdependent with one another and with their physical environment, impacting upon and being impacted by each other and their environment.

f. Both ecosystems and species vary in their ecological amplitude, i.e., their parameters and capacities to interact with other components of the ecosystem and with other ecosystems.

2. The ecosphere and all its ecosystems undergo continuous change.

a. Throughout its history, Earth has undergone and continues to undergo extensive changes in environmental factors, such as climate, topography, geologic processes and distribution of oceans and continents.

b. Organisms have changed greatly through small consecutive modifications of their genetic composition, thus adapting to their environment. Such changes continue to occur through time and space. Extinction of species has resulted from failure to adapt to environmental change.

c. Ecosystems arise as organisms invade formerly lifeless water, or bare mineral substrates (rocks, sand), or as pre-existing ecosystems are modified. New combinations of organisms and environments produce new ecosystems. As ecosystems operate through time, their living and non-living components contribute to, interact with, and change the character of the system. Natural and human processes (fires, landslides, earthquakes, urbanization, etc), alter ecosystems in varying degrees. Ecosystems have various degrees of resiliency to alteration, giving them varying capacities and rates of recovery from alteration. If a given ecosystem is perturbed enough, by removal of old or addition of new components and change of processes, it can be reduced to near or actual extinction. However, some type of ecosystem subsequently will develop unless the area is rendered toxic to all life for extended periods.

d. As an ecosystem persists and matures through long periods of time there is a tendency toward an increase in the diversity of organisms. In mature ecosystems, a steady state character persists, even though individual organisms and species arrive, die, or depart, and even though particular kinds of organisms may not always be present. In general, complex mature ecosystems are more resilient to physical, biological, economic, and social variations than developing systems and generally are more stable.

e. Niches become more specialized as ecosystems mature. Changes in ecosystems interact with changes in organisms, resulting in greater specialization of niches. Some species have expanded their niches by learned behavior. These changes enable more types of organisms to live in the ecosystem, thus further changing its character.

f. Some characteristics of an ecosystem are influenced strongly by its origin and history.

C. The energy and materials necessary for all life are components of each ecosystem.

1. Energy used in all ecosystems comes originally and primarily from the sun; materials come from components of the ecosphere.

2. Green plants, through photosynthesis, use the sun's energy to convert water, carbon dioxide, and small amounts of minerals into high-energy organic compounds that power all life processes. This energy is released by the process of respiration in organisms. Both of these processes (photosynthesis and respiration) are limited to fairly narrow ranges of temperature, moisture, and chemical conditions, and by the genetic composition of organisms.

3. Materials are cycled and recycled via foodwebs through plants to herbivores to fewer carnivores, etc. Ultimately they are reduced by many decay organisms to inorganic forms, completing the cycle, as materials are reused. Examples are the nitrogen and carbon cycles.

4. Some energy moves through the physical and chemical components of ecosystems; the rest flows through foodwebs. No energy conversion is 100 percent efficient, so energy is constantly dissipated from the system. This dissipation of energy results in a deficit. A constant infusion of additional energy is required for organisms and ecosystems to live and to grow. The sun provides this energy. Some energy is stored in organic materials that can be used in the future.

5. Most natural ecosystems are adapted to operate on the energy and materials directly available to them. These resources are renewable by recycling; in natural ecosystems, the rates of consumption and renewal are balanced. While primitive human social groups are similiarly adapted, modern human-made systems require heavy subsidization of energy and materials.

D. Each ecosystem includes a number of species populations, the size and stability of which vary, depending on biotic and abiotic changes in the system.

1. When a population is introduced into an ecosystem to which it is adaptedm the excess of births over deaths results in a typically S-shaped pattern of growth. Population Growth levels off as birth and death rates equalize; decline occurs as death rate exceeds birth rate.

2. Birth rate and death rate are influenced by factors intrinsic and extrinsic to the population ("limiting factors"). Intrinsic factors are genetic (reproductive capacity, innate behavior, food requirements, resilience, etc.). Extrinsic factors are environmental. They include chemical factors (nutrients, toxins, etc.) and physical factors (temperature, humidity, etc.), as well as factors related to interactions with its own and other populations (competition, predation, parasitism, etc.). Density of a population affects all of these extrinsic relationships.

   a. For modern humans, birth rate is affected primarily by socio-cultural means (e.g., delay in marriage, contraception, abortion, etc.); death rate during infancy, childhood, and even adulthood is affected by technology (e.g., medical science, sanitation, dietary improvement, etc.). While both have changed in recent times, the net result has been a substantial increase in size and growth rate of the world's human population.

3. The size of a population in an ecosystem will vary from time to time with changes in physio-chemical factors and with biological interactions, thus defining the "carrying capacity" of the ecosystem for that population under a given set of conditions. To a degree, an ecosystem's carrying capacity can be increased by technology, but only within finite limits.

4. Spatial arrangements of individuals in populations are as important in ecosystem functioning as total numbers of individuals in the population.

5. Ecological amplitude, environmental barriers to dispersal, and history control distribution of populations.

SECTION II. Fundamentals Concerning Humans as Ecosystem Components

A. Humans make use of ecosystems to satisfy basic needs and desires.

B. Humans affect ecosystems.

C. Ecosystems affect humans.

D. Complex interactions among humans and other ecosystem components occur continuously.

E. Humans are accountable for their effects on ecosystems.

* * *

Organisms influence the characteristics of ecosystems and are, in turn, strongly influenced by the characteristics of the ecosystems in which they live. Humans now are the most influential of the Earth's organisms and influence all of Earth's ecosystems.

A. Humans use ecosystems to satisfy basic needs and desires:

1. The basic biological needs that must be met for humans to live and to grow and for the species to survive:

   a. Habitable climate--temperature range, moisture, etc.

   b. Energy and materials--food, air, water, organic chemicals, etc.

   c. Rest and exercise.

   d. Other humans for reproduction.

   e. Protection against environmental stresses--sun, wind, rain, disease, etc.

2. Among humans, essential psychological and social needs and desires requiring fulfillment include security, love, esteem, self-fulfillment, social interaction, health, comfort, material goods, religious experiences. Humans cannot grow and completely develop mentally unless these needs are met.

3. Human cultures each have their own perceived needs and desires that make different demands and impacts on ecosystems. In time of stress, many of these needs and desires can be adjusted.

   a. Universal human desires for more and more material goods are expressed differently in different cultures. As the satisfaction of desires increases, human impact on ecosystems increases.

   b. Value systems play a highly significant role in determining the kind and extent of a society's impact on ecosystems.

c. Increasing the consumption of energy and materials often leads to deleterious impacts on ecosystems.

(1) Increased CO_2 and heat in atmosphere, e.g., heat islands over cities.

*(2) Albedo changes

(3) Introduction of new synthetic substances that produce an effect that is an order of magnitude different (and often adverse) on living systems, e.g., chemicals that are toxic mutagenic, carcinogenic, either chronic or acute.

d. Concentration of humans, especially in built environments, intensifies the deleterious effects of humans on ecosystems.

e. Among culturally--specific perceived needs are:

(1) Preservation of land, ecosystems, and species, together with conservation of materials and energy.

(2) Satisfaction of desires for status and for exotic materials and experiences.

(3) Economies of scale concentrating human activities that result in major changes in ecosystems.

(4) Planned obsolescence of manufactured goods.

(5) Dietary customs, family size, work attitudes.

B. Humans affect ecosystems, as an all-pervasive species in the ecosphere that has a special type of ecological dominance, exerting major kinds of influences on ecosystems.

1. Human domination results from:

a. Intellectual capacites that permit the development of:

(1) Technology that gives unique control over energy flows, food and goods production, disease, and other factors that would otherwise limit human populations.

(2) Unique institutional and technological control over other populations in ecosystems; e.g., domestication of some species--pigs, dogs, cows; suppression of "undesirable species"--rats, mosquitos, dandelions, etc.; and encouragement of "desirable species"--Kentucky bluegrass, shade trees, pheasants, deer, etc.

b. Biological and cultural adaptation to a wide range of environmental conditions, which greatly increases effects of humans on ecosystems ranging from improvement to destruction.

(1) The built environment on a metropolitan scale constitutes a major change in kinds of human settlements.

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* Reflective power: that fraction of incident light reflected by a surface or body.

c. Sheer population size.

d. Great specialization and diversity in the division of labor.

2. Human tendencies to form and function in social and corporate groups and institutions promote development of human habitats that currently create unique concentrated demands on ecosystems and further increase human effects on ecosystems.

a. These effects are augmented by concentration of humans into small areas, such as metropolises.

b. Humans settlements on a metropolitan scale have effects on ecosystems that rival those of mountains, glaciers, droughts, and floods.

3. Burgeoning human populations and technological capabilities are of relatively recent origin. This increasingly rapid growth and development has brought to ecosystems increasingly rapid changes, some of which are potentially irreversible.

4. Human aesthetic, ethical, moral, and spiritual values reinforce and/or conflict with harmonious relationships within ecosystems.

C. Ecosystems affect humans, as the arenas in which all human perception and activity take place.

1. Humans and all their products function in an ecosystem framework.

a. The built environment radically transforms human society and culture--as space, as function, as sensory stimulus, as activation, as support, as hazard.

b. Past ecosystem processes and events have produced major biological and cultural differences in human populations.

2. Changes in the ecosphere due to increasing human numbers and technology have short- and long-term effect, e.g.,

a. Short-term effects on:

(1) Birth and death rates

(2) Biological fitness of human populations as measured by growth rates, disease patterns, nutritional levels, aging, etc.

(3) Use of non-renewable materials and stored energy sources.

(4) Functional capacities of individuals and populations--mental productivity, attitude, etc.

(5) Renewable resources.

b. Long-term effects on:

(1) Genes and chromosomes and their evolutionary consequences.

(2) Selection pressures--elimination of some and/or introduction of others.

(3) Ecosystem changes resulting from evolution of their component populations.

(4) Health and life cycles.

(5) Global climate.

(6) Reserves of non-renewable and renewable resources.

(7) Culture.

3. Although several species exhibit non-genetic information transfer, the built environment and the psychological milieu have a powerful effect on humans because information transfer by verbal and learned behavior is such a large part of the contemporary human environment. They operate on humans in a parallel and synergistic manner in much the same way as do physical and chemical components of ecosystems.

D. Complex interactions among humans and other ecosystems components occur continuously.

1. Humans' perceptions of their needs, their impacts on ecosystems, and ecosystem impacts on them reflect the cultural and individual values, goals, skills, insights, and capabilities of the individuals, groups, institutions, and nations involved.

2. Relationships among components of ecosystems are reciprocal, ranging from mutually beneficial to unidirectionally destructive.

3. A governing relationship among and within components of ecosystems is a feedback mechanism (physical, chemical, social, behavioral), ranging from highly sophisticated to rudimentary.

4. Human activities often have synergistic effects on ecosystems and vice versa.

5. Human activities present both solutions and problems for ecosystem maintenance and management.

a. Potentially positive activities of humans within ecosystems, some evidences are:

(1) Domestication and husbandry of plants and animals.

(2) Reduction of disease and mortality.

(3) Constructed and controlled space for living, working, manufacture, storage, recreation, transportation, etc.

(4) Preservation of genetic stocks of non-domesticated organisms and preservation of specific ecosystems.

(5) Perception and appreciation of ecosystems and their components.

(6) Development of human law and property rights.

(7) Reduced human populations under certain social-cultural conditions.

(8) Elaboration of functional roles (i.e., niches) for humans, which increases diversity of ecosystems.

b. Potentially destructive activities of humans within ecosystems, some evidences are:

(1) Discrete large scale events that warn of imbalances between human activities and ecosystems functioning (e.g., changes in atmosphere, marine oil slicks, dustbowls, floods, etc.).

(2) Decreasing numbers of individuals, declining continuity and area of ecosystem-type, and reduced average species diversity for given ecosystem type (e.g., decline of predatory birds and mammals, of tall grass prairies, etc.).

(3) Increases in environmentally-induced human health problems (e.g., pollution-induced disease, noise-induced deafness, etc.).

(4) Destruction/modification of habitats, creation and concentration of pollutants, and other inadvertent or deliberate acts.

(5) High rates of energy dissipation and production of pollutants in heavily urban areas.

(6) Depletion of relatively concentrated sources of raw materials.

E. Human ability to comprehend both the basic concepts about ecosystem processes, and the consequences of human actions in relation to ecosystem processes, short- and long-term, must be coupled with their ability to control their actions, in order to produce an ethic of accountability for human impacts on ecosystems. The preservation of civilizations as we know them depends on the exercise of an ethic of accountability for human impacts on ecosystems, balanced with the realization that humans require modification of the natural environment (housing, vehicles, agriculture, extensions of communication--e.g., books, radios, TV, etc.) which, even if primitive and crude, allows humans in small groups to extend culture beyond the mere survival level.

SECTION III. Methods for Harmonizing Human Activities with Ecosystem Processes to Achieve Environmental Quality

A. Different kinds of methods.

B. Institutions, processes, and attitudes for implementation.

C. One basic process for harmonizing human activities with ecosystem processes.

D. Formal policy and law.

* * *

Using the fundamentals of environment outlined in Sections I and II, this section focuses on ways to implement positive actions for harmonizing human activities with ecosystem processes. This section is especially applicable in the United States, but has relevance elsewhere in the world.

A. The methods by which human activities, local through global, are harmonized with ecological processes, are complex and outcomes are not always predictable. Effects of ecosystem changes on human biology and culture are inevitable, ever present, and of limited susceptibility to management. Detailed knowledge needed to make environmental predictions often is incomplete or unavailable. There are not uniformly dependable social-political processes for responsible decision-making. The ways that societies pursue harmonization include:

   1. Education of the public, formal and informal.

   2. Appreciation and practice of various art forms in sensitizing humans to different types and facets of environmental quality.

   3. Encouragement of corrective actions by individuals, businesses, government agencies, etc.

   4. Voluntary adoption and implementation of policies and standards.

   5. Establishment of formal policies, guidelines, and standards.

   6. Use of economic and social incentives.

   7. Enforcement of policies, guidelines, and standards.

B. Institutions, processes, and attitudes for implementing investigative, preventive, remedial, and creative actions that will harmonize human activities with ecosystem processes are:

   1. Education and communication

   2. Religious, aesthetic, ethical and moral influences

   3. Science and technology

   4. Civic and social institutions

5. Governmental and political processes

6. Industry and commerce

*C. One basic process for harmonizing human activities with ecosystem processes involves adjusting perceived imbalances, identifying and addressing problems, and utilizing opportunities through institutions and individuals:

1. Investigating ecosystems processes and components, including results of human activities on ecosystems and the influences of ecosystems on human functioning.

2. Recognizing the importance of ecosystem processes and significance of ecosystem changes.

3. Identifying causes of ecosystem changes and their consequences.

4. Arraying alternative action strategies that would maintain and enhance beneficial ecosystem changes and would stop or reduce detrimental changes, with special attention to irreversible/irretrievable changes, and to long-range vs. short-range commitments of resources.

5. Analyzing and evaluating alternatives within a broad array of environmental, social, and economic criteria, recognizing that criteria and values will differ according to the circumstances of politics, geographic location, scale, time, and society (war, good times, flood, famine, etc.).

6. Selecting among alternatives and adopting a policy. (This occurs at individual through global levels, consciously and unconsciously).

7. Choosing and implementing actions to carry out policy.

8. Monitoring and evaluating effects of implemented policies and actions.

9. Feeding information from step #8 back through step #1, etc., to keep actions adjusted to changing data bases, requirements, conditions, and perceptions.

D. Increasing scientific knowledge of ecosystem processes in the United States and the world, coupled with increasing citizen awareness of ecosystem dysfunctions and acute environmental problems, led to establishment of policies and enactment of environmental legislation in the 1960's, which were augmented and adjusted in the 1970's.

1. The U. S. National Environmental Policy Act of 1969 incorporates a number of the fundamentals of environment into its Title 1, as part of the policy, building natural principles into U. S. law. Incorporation of these principles into U. S. law places a special mandate on human actions today and in the future. Title 1 of NEPA reads as follows: (Emphasis is added to indicate portions that state fundamentals presented in Sections I and II of this paper.)

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* In the U. S., successful use of this process requires ample input from and participation of the public at all nine steps.

"101a. The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

"101b. In order to carry out the policy set forth in this Act, it is continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may --

(1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(5) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities, and

(6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

2. Other U. S. laws address specific needs for harmonizing various results of human activities with ecosystem processes, e.g.,

a. Environmental Education Act of 1970

b. Refuse Act of 1899

c. Clean Air Act of 1966 and Amendments of 1970, 1974, 1976

d. Water Quality Act of 1966 and Amendments of 1972

e. Federal Insecticide, Fungicide and Rodenticide Act of 1971, and Federal Environmental Pesticide Control Act of 1972

f. Coastal Zone Management Act of 1972

g. Marine Mammal Protection Act of 1972

h. Endangered Species Preservation Act of 1973

i. Marine Protection, Research and Sanctuaries Act of 1972

j. Solid Waste Disposal Act of 1965, and Resource Recovery Act of 1970, Solid Waste Amendments of 1976

k. Noise Control Act of 1972

l. Non-Nuclear Energy Research and Development Act of 1974

m. Forest and Rangeland Renewable Resources Planning Act of 1974, and Amendments of 1976

n. Toxic Substances Control Act of 1976

o. Whale Conservation and Protection Act of 1976

3. International environmental policy is exemplified in:

a. Resolutions of the 1972 Stockholm Conference on the Human Environment

b. Work of the United Nations Environment Programme

c. Convention of Oil Spills, Trade in Endangered Species, World Heritage Trust, Ocean Dumping

d. Revision in Law of the Sea Convention (in progress)

e. Resolutions of the 1975 Kyoto Conference on the Human Environment

f. Resolutions of U. N. Conferences:

(1) Population, Bucharest, 1974

(2) Food, Rome, 1974

(3) Women's Rights, Mexico City, 1975

(4) Human Settlements, Vancouver, 1976

g. Results from future U. N. Conferences:

(1) Water, Mardel Plata, Argentina, April 1977

(2) Environmental Education, Tesila, Russia, October 1977

(3) Desertification, 1977

h. Recommendations of U. N. Agency Workshops

(1) Environmental Education, Belgrade, 1975

(2) Mediterranean Pollution, Barcelona, 1976

i. Bilateral and multilateral environmental agreements, such as US-USSR Bilateral Environmental Agreement of 1972

BASIC TOPICS AND DEFINITIONS

This section contains descriptions of basic Environmental Education topics and the terms commonly associated with those topics.

I. ECOLOGY: The interdependence of organisms, including people, with each other and with their physical environment.

Term	Definition
Biological control	The introduction of birds, insects, fish or other animals to control other organisms.
Community	The populations of all species that live in a particular area.
Cycles: water, CO_2 carbon, nitrogen, phosphorus	A natural recycling system of movement through an ecosystem often through plants and animals activated by solar energy. The water cycle includes evaporation, rain, rivers, and ocean.
Decomposers	Organisms such as worms, bacteria, and fungi that eat dead organic material and convert it into more nutrients.
Diversity	The complexity of a community.
Dominance	A plant or animal that controls the largest portion of energy in a community.
Ecological niche	The unique function of a plant or animal in a biological community.
Ecology	The scientific study of human and nonhuman organisms, their relationship to their physical environment (air, water, land, sun, etc.) and to each other. The discipline presupposes a "holistic" view of the universe and its intricate interrelationships.
Ecosphere	The complex interrelated, interactive life support system of the Earth.
Endangered species	Plants, animals, fishes, birds, or insect species that are being destroyed so rapidly that they may cease to exist without better protection.
Enthalpy	The sum of the internal energy of a body and the product of its volume multiplied by the pressure.
Entropy	Inevitable inefficiency of energy transfer. All transfer in the food web involves entropy. (The second law of thermodynamics).

Term	Definition
Food pyramid	An ecological hierarchy of food relationships expressed quantitatively in which a chief predator is at the top, each level preys on the next lower level.
Food webs	Interdependent feeding levels which involve transfer of energy and materials.
Nitrogen fixing bacteria	Soil bacteria that converts inorganic nitrogen into usable plant nutrients.
Photosynthesis	A process by which green plants utilize solar energy to make chemical energy.
Plankton	Microscopic plants and animals in lakes, rivers, and oceans that are at the beginning of the food chain.
Symbiosis	Combinations of dissimilar organisms that produce mutual benefits.
Territoriality	A sense of possession of an area, which is defended against intruders.
Watershed	A land area that constitutes a basin for catching rain and guiding it above ground and underground in a common outlet.

II. HUMAN POPULATION: The numbers of people in any human community. "Populations" can be human or nonhuman.

Term	Definition
Contraceptive	The use of physical or chemical means of preventing pregnancy including surgical and rhythm methods. Each method varies in degrees of reliability.
Doubling time	The time it takes for a population to double.
Exponential increase	Geometrical increases in population that accelerates the total numbers through doubling times: 1, 2, 4, 8, 16, 64, etc.
Family planning	Having only the number of children per family that is desired by the partners, couple.
Population age distributions	The proportional numbers at various age levels. Each country has a different distribution pattern, most people can be young or most people can be old.
Population mobility	Movements of people from one area to another either in large numbers or continuous flows.

Term	Definition
Zero Population	Having only the number of births that replaces deaths, so that the total population does not increase.

III. RESOURCES: Natural and human materials and processes which people might use to serve human objectives. For example, it can include minerals, food, and information.

Term	Definition
Energy	Capacity to do work. Work produces change but requires power. Energy makes plants grow, winds blow, and automobiles go. It permits us to think and move. Energy sources can come from stored fossil fuel, from incoming solar energy, from geothermal heat, from tides, and from fission and nuclear sources.
Non-renewable	Resources that cannot be replaced if they are consumed or destroyed, because they are finite in amount, such as petroleum or minerals.
Nutrients	The chemical and biological elements that provide energy and growth to plants and animals.
Renewable	Resources that can be replaced even if they are consumed or destroyed, such as wheat or fish.

IV. POLLUTION: Contamination that reaches levels destructive to the maintenance of the quality of the life support systems.

Pollution can occur to air, water, land, and can be experienced through human senses such as sight, sound, and smell.

Pollution can occur through eutrophication, which speeds up growth in water and fills in lakes and rivers with plants and sediments.

Pollution can occur through toxification, which either kills or injures the organism dependent on the resources. For instance, automobile exhaust produces toxic pollution that makes "smog" and contributes to discomfort, illness, and death.

V. VALUES: The judgment of the worth or desirability of something.

Term	Definition
Cooperation	People working together for the good of the group.
Democracy	When each member of a group is involved in participation in the formation of group rules and policies.

Term	Definition
Esthetic values	The quality of an experience. Esthetic value is not instrumental to something else, but is "good" in itself. It combines understanding and feeling and can consist of the beauty of art, nature, or the style and quality of human behavior.
Ethical values	The human consequences of human actions and how they support or violate the principles of "the worth and dignity of the human person." Ethical values can operate through direct interpersonal relations and also through indirect institutional action such as government, economics, and business.
Equity	A fair distribution of the goods, services, and opportunities generated by an economic system.
Health	A quality of life involving dynamic interaction and interdependence among the individual's physical well-being, his/her mental and emotional reactions, and the social complex in which the individual exists.
Progress	The belief by a society that a set of social changes will provide a better life for most of its members.

VI. SYSTEMS: A set of interdependent parts where the whole is greater than the sum of its parts. There are natural physical and biological systems, social systems such as economic systems, and technological systems such as a highway system. Natural systems are created by nature; social and technical systems are invented by people.

Term	Definition
Closed system	A finite and fixed number of parts. Non-renewable resources are part of a "closed system."
Exotics	Plants or animals not native to their location.
Growth	Commonly used to mean the quantitative expansion of an economy which increases wages, profits, gross national product, and the amount of goods and services.
Interdependence	A system where each member relies on the other for his/her mutual benefit.
Life support system	The air, soil, water, and heat on the surface of the earth that provides a basis for organisms and human life to survive through the development of ecological systems.

Term	Definition
Malthusian	Thomas Malthus, an 18th Century economist, saw that is population expands geometrically while food expands at a slower rate, people would soon starve. The concept now refers to the dire consequences of permitting open expansion of population and consumption in a life support system with limited resources.
No-growth	A stagnant economic system that does not change significantly.
Open system	An expanding number of parts. Ideas and information have no restrictions on numbers. Symbolic systems can be "open."
Steady-state	A society and its economy in a state of ecological equilibrium which is able to keep the life support system from deteriorating. A dynamic steady state system reorganized the economy to improve quality of life while also achieving ecological equilibrium.
Tragedy of the Commons	Parable environmentalists use to show how individual interests in exploiting natural resources contradicts the survival needs of the community. If the common life support system has finite resources, a procedure that permits individuals to use more than their fair share will cause destruction to the "commons." The commons can be land or any other limited resource.

VII. PLANNING: Planning can be individual or social. It is a process used to decide on the best goals and the best means to achieve those goals. Social planning of cities and countries tries to reduce human dependence on random accidents and to permit common goals to be achieved and the future to be more predictable. City planning is now quire a common practice.

Term	Definition
Ad hoc	Planning that responds piecemeal to separate problems with short-range solutions.
Carrying capacity	The maximum capacity of an area to support a given population without destruction of the life support system or the quality of life.
Cost/Benefit Analysis	Procedures for assessing whether there is more to be gained than to be lost by a plan. It can include economic, social, and ecological considerations.
Environmental Impact Statement (E.I.S.)	An attempt to apply a cost/benefit analysis to a specific proposed project.
Ekistics	A study of human settlements drawing on various fields such as architecture, engineering, city planning, sociology, etc.

Term	Definition
Forecasting	Using scientific methods to anticipate the future; often involves projecting trends such as population increases to see where they are heading. Permits decisions of whether to change trends or adapt them.
Futuristics	The study of the kinds of futures that are possible as a basis for deciding which is the most desirable.
Integrative	Planning that takes account of a number of problems and goals simultaneously and aims toward both short and long range solutions.
Irreversibility	Actions which prevent a second chance, such as when petroleum is burned or prime topsoil is lost to the point where erosion or desert replaces a stable, productive ecosystem.
Lead time	The advance time it will take to develop a plan and put it into effect. Major changes in energy sources may take decades to change from one system (petroleum) to another (solar, etc.). So, forecasting is necessary to anticipate the lead time.
Low energy consumption technology	Machines and other kinds of technology which are designed to use minimum amounts of energy, such as a small car vs. a big car.
Overload	Exceeding carrying capacity.
Participatory planning	Democratic involvement by the community in the planning process.
Pesticides	Chemical technology used to kill insects. Specific pesticides kill a precise group of insects, broad spectrum pesticides kill a great number of types of insects.
Priorities	Decisions that provide an order of importance for a number of planning objectives.
Social cost (externalities)	The cost paid by the larger society that may not be paid by the manufacturer. For instance, there may be costs which a manufacturer pays to have garbage taken away, but the larger society may pay for the costs of the garbage dump, the pollution of ground water, and the loss of the resources in the garbage. The social cost can be in money, health, and quality of life.
Trade-off	Decisions (based on priorities) of what should be given up in order to achieve something else. Trade-offs are necessary only when two objectives cannot both be achieved, only one at the sacrifice of the other.

Term	Definition
Zero-sum vs. non-zero-sum	When scarce resources are divided among a limited number of people, the more some get, the less others get. If some win, others lose. Zero-sum applies to scarce resources and raises the questions of equitable distribution. Zero-sum applies also to future generations. The petroleum used now is taken from future generations. In non-zero-sum, abundant resources can be created so that no one has to lose what another gains.

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Using Environmental Education Resource Material - A Caution

While there are numerous materials available on a wide variety of environmental issues and problems, teachers and students must be aware that some of the material contains a natural bias. Material from special interest groups and industry sponsored materials generally represent the viewpoints of their respective groups or organizations. In spite of this handicap much of this material can be used with teacher discretion related to the maturity and ability levels of the students. Use of this type of material can in fact provide students with many opportunities to learn to distinguish fact from opinion, to analyze the writer's position, and to discover how hidden bias may distort conclusions. To avoid having students draw conclusions on environmental issues based on possibly biased information, information should be obtained from a variety of resources representing a broad spectrum of views on the issue.

Agencies and Organizations Concerned with Environmental Education

Federal Agencies*

Agency for International Development
Department of State
320 Twenty-First Street, N.W.
Washington, D.C. 20523

Agriculture, Agribusiness, and
Natural Resources Education
Department of Education
Washington, D.C. 20202

Appalachian Regional Commission
Public Affair Office
1666 Connecticut Avenue, N.W.
Washington, D.C. 20235

Bureau of Indian Affairs
Department of the Interior
1951 Constitution Avenue, N.W.
Washington, D.C. 20245

Bureau of Land Management
Department of the Interior
Washington, D.C. 20240

Center for Population Research
National Institute of Child Health
and Human Development
National Institute of Health
Public Health Service
Department of Health and
Human Services
Bethesda, MD 20014

Community Services Administration
1200 Nineteenth Street, N.W.
Washington, D.C. 20506

Council on Environmental Quality
Executive Office of the President
722 Jackson Place, N.W.
Washington, D.C. 20006

Department of Energy
Washington, D.C. 20545

Department of Housing and
Urban Development
451 Seventh Street, S.W.
Washington, D.C. 20410

Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

Distribution Division
Coast and Geodetic Survey
4200 Connecticut Avenue, N.W.
Washington, D.C. 20235

Energy Research and
Development Administration
Office of Public Affairs
Washington, D.C. 20545

Extension Service
Department of Agriculture
Washington, D.C. 20250

Federal Highway Administration
Department of Transportation
400 Seventh Avenue, S.W.
Washington, D.C. 20590

Forest Service
Department of Agriculture
Washington, D.C. 20250

Geological Survey
Department of the Interior
National Center
12201 Sunrise Valley Drive
Reston, VA 22092

National Aeronautics and
Space Administration
400 Maryland Avenue, S.W.
Washington, D.C. 20546

National Institute of Education
Office of Dissemination and
Resources
Department of Education
Washington, D.C. 20208

Directorate for UNESCO Affairs
Bureau of International Organization
Affairs
Department of State
Washington, D.C. 20520

Energy and Education Action Center
Department of Education
Suite 514, Reporters Building
300 Seventh Street, S.E.
Washington, D.C. 20202

Environmental Protection Agency
Office of Federal Activities (A-104)
401 M Street, S.W.
Washington, D.C. 20460

Federal Aviation Administration
Department of Transportation
800 Independence Avenue S.W.
Washington, D.C. 20591

Fish and Wildlife Service
Department of the Interior
Washington, D.C. 20240

4-H Youth Programs
Science and Education Administration--
Extension
Department of Agriculture
Washington, D.C. 20250

Interstate Commission on the
Potomic River Basin
814 East West Towers
4350 East West Highway
Bethesda, MD 20014

National Endowment for the Humanities
806 Fifteenth Street, N.W.
Washington, D.C. 20506

National Institute of Environmental
Health Services
National Institutes of Health
Public Health Service
Department of Health and Human
Services
Bethesda, MD 20014

National Institute of Law
Enforcement and Criminal Justice
Law Enforcement Assistance
Administration
Department of Justice
Washington, D.C. 20531

National Park Service
Department of the Interior
Washington, D.C. 20240

National Sea Grant Program
National Oceanic and Atmospheric
Administration
Department of Commerce
3300 Whitehaven Street, N.W.
Washington, D.C. 20235

National Science Foundation
Washington, D.C. 20550

Office of the Assistant Secretary
for Health
Department of Health and Human
Services
Washington, D.C. 20201

Office of Coastal Zone Management
National Oceanic and
Atmospheric Administration
Department of Commerce
3300 Whitehaven Street, N.W.
Washington, D.C. 20235

Office of Environmental Education
Department of Education
400 Maryland Avenue, S.W.
Room 2025
Washington, D.C. 20202

Office of Population Affairs
Population Education Program
Department of Health and
Human Services
200 Independence Avenue
Washington, D.C. 20201

Office of Public Affairs
U.S. Department of Energy
Washington, D.C. 20545
Telephone: (301) 353-4357

Small Business Administration
Office of Public Administration
1441 L Street, N.W.
Washington, D.C. 20416

Smithsonian Institution
Chesapeake Bay Center for
Environmental Studies
Rt. 4, Box 622
Edgewater, MD 21037

Soil Conservation Service
Department of Agriculture
Washington, D.C. 20250

Subcommittee on Environmental
Education
Federal Interagency Committee
of Education
Hubert H. Humphrey Building
Room 313-H
200 Independence Avenue, N.W.
Washington, D.C. 20201

Tennessee Valley Authority
Norris, TN 37828

United States Department
of State
Bureau of Public Affairs
Washington, D.C. 20520

United States Water Resources
Council
Suite 800
2120 L Street, N.W.
Washington, D.C. 20037

U.S. Army Corps of Engineers
Department of the Army
Office of the Chief of Engineers
Washington, D.C. 20314

U.S. Bureau of the Census
Subscriber Service Division
Room 1121, Federal Building 4
Washington, D.C. 20233

U.S. Consumer Product Safety
Commission
San Francisco Area Office
100 Pine Street
Suite 500
San Francisco, CA 94111
Telephone: (415) 556-1816

U.S. Department of Commerce
National Oceanic and
Atmospheric Administration
National Environmental
Satellite Service
Satellite Field Service
Station
Honolulu International Airport
Tower Building
Room 514
Honolulu, HI 96819

U.S. Department of the Interior
Washington, D.C. 20240

U.S. National Commission for UNESCO
Department of State
Washington, D.C. 20520

Veterans Administration
Department of Veterans Benefits
Washington, D.C. 20420

*For further information on these agencies consult the publication: Environmental Education Activities of Federal Agencies, compiled and edited by John F. Disinger in cooperation with The Subcommittee on Environmental Education of the Federal Interagency Committee on Education, published by the ERIC Center for Science, Mathematics, and Environmental Education, College of Education and School of Natural Resources, The Ohio State University, 1200 Chambers Road, Third Floor, Columbus, Ohio 43212

Many of the agencies listed have local offices. Consult the United States Government Section of the telephone directory for information or call Federal Information Center at 546-8620 (Oahu).

State

County of Hawaii

Department of Agriculture
75 Aupuni Street
Hilo, HI 96720
Telephone: 961-7361

Environmental Education Coordinator
Hawaii District Office
Department of Education
75 Aupuni Street
Post Office Box 4160
Hilo, HI 96720
Telephone: 961-7351

Department of Hawaiian
Home Lands
160 Baker Avenue
Hilo, HI 96720
Telephone: 935-5575

Department of Health
75 Aupuni Street
Hilo, HI 96720
Telephone: 961-7210

Environmental Health Services
Telephone: 961-7371

Air Water Pollution Control
191 Kuawa Street
Hilo, HI 96720
Telephone: 961-7551
Kealakekua, HI 96750
Telephone: 322-9331

State Health Planning and
Development Agency
1190 Waianuenue Avenue
Hilo, HI 96720
Telephone: 935-9888

Department of Land and
Natural Resources

Conservation Hotline
Telephone: Enterprise 5469

Division of Forestry and Wildlife
Telephone: 961-7291

Tree Nursery
Kamuela, HI
Telephone: 885-4250

Endangered Species Project
Pohakuloa, HI
Telephone: 935-5197

Division of Land Management
Hilo, HI
Telephone: 961-7245

Division of State Parks

Hilo	Telephone:	961-7200
Hapuna	Telephone:	882-7995
Kalopa	Telephone:	775-7114
Lapakahi State Historical Park Mahukona	Telephone:	889-5566
Pohakuloa Camp	Telephone:	935-7237
Wailoa Center	Telephone:	961-7360

Division of Water and
Land Development

Hilo	Telephone:	961-7279
Kamuela	Telephone:	885-7037

Department of Planning and Economic
Development

Energy Hotline
Telephone: Enterprise 8016

University of Hawaii at Hilo
University Operator Telephone: 961-9311

Cooperative Extension
Service

Kainaliu	Telephone:	322-2718
Kamuela	Telephone:	885-7318
Naalehu	Telephone:	929-7012
875 Komohand Hilo, HI	Telephone:	959-9155

Institute for Astronomy
177 Makaala Street
Hilo, HI 96720
Telephone: 935-3371

Marine Advisory Program
2349 Kalanianaole Street
Hilo, HI 96720
Telephone: 935-3830
Kaianaliu
Telephone: 322-2577

County of Hawaii

Office of Housing and
Community Development
Community Development
Hilo Armory
Hilo, HI 96720
Telephone: 961-8379

Parks and Recreation
Parks Maintenance Superintendent
Railroad Avenue
Hilo, HI 96720
Telephone: 935-1446
Recreation Director
Telephone: 961-8311

Planning Department
Telephone: 961-8288

Department of Public Works

Plans and Surveys Bureau
Telephone: 961-8327

Sewers and Sanitation Bureau
Telephone: 961-8338

Water Supply Department
25 Aupuni Street
Hilo, HI 96720
Telephone: 935-1127

State

County of Kauai

Department of Agriculture
Telephone: 245-4411

Department of Hawaiian
Home Lands
Telephone: 245-4329

Department of Land and
Natural Resources

Conservation Hotline
Telephone: Enterprise 5469

Division of Fish and Game
Telephone: 245-4444

Division of Forestry
Telephone: 245-4444

Division of Land Management
Telephone: 245-4326

Division of State Parks
Telephone: 245-4444

Division of Water and
Land Development
Telephone: 245-4444

Environmental Education Coordinator
Kauai District Office
Department of Education
3060 Eiwa Street
Post Office Box 1607
Lihue, HI 96766
Telephone: 245-4366

Department of Health
3040 Umi Street
Lihue, HI 96766

Environmental Health Services
Telephone: 245-4323

Health Education
Telephone: 245-4495

Pollution Control
Telephone: 245-4323

State Health Planning and
Development Agency (SHPDA)
Telephone: 245-4495

Department of Planning and Economic
Development

Energy Hotline
Telephone: Enterprise 8016

University of Hawaii Extension Service
Telephone: 245-4471

Sea Grant Marine Advisory Program
Telephone: 245-4471

County of Kauai

Planning Department
4280 Rice Street
Telephone: 245-3919
CZM Coordinator
Telephone: 245-9331

Public Works Department

Division of Parks and Recreation
Telephone: 245-8821

Beautification Section
Kalaheo
Telephone: 332-9541

Division of Sewers and Drainage
Telephone: 245-4751

Water Department
Telephone: 245-6986

State

County of Maui

Department of Agriculture
Telephone: 244-4229

Department of Hawaiian Home Lands
Telephone: 244-4248

Department of Land and Natural Resources

Conservation Hotline
Telephone: Enterprise 5469

Division of Fish and Game
Telephone: 244-4352

Division of Forestry
Telephone: 244-4352

Division of Land Management
Telephone: 244-4352

Division of State Parks
Telephone: 244-4354

Environmental Education Coordinator
Maui District Office
Department of Education
54 High Street
Post Office Box 1070
Wailuku, HI 96793
Telephone: 244-4261

Department of Health

Environmental Pollution
Telephone: 244-4228

Litter Control
Telephone: 244-4228

Environmental Health
Telephone: 244-4255

Health Education
Telephone: 244-4334

State Health Planning and Development Agency
Telephone: 244-4274

Department of Planning and Economic Development

Sun Day Sun Dial
Telephone: Enterprise 8016

University of Hawaii

Cooperative Extension Service
Telephone: 244-3242

Sea Grant Marine Advisory Program
Telephone: 244-4157

Planning Department
Telephone: 244-7735

Environmental Coordinator
Telephone: 244-7735

Water Supply Department
Telephone: 244-7835

Water Quality
Telephone: 877-0275

Parks Department

Central Maui	Telephone: 244-5514
East Maui	Telephone: 572-8122
West Maui	Telephone: 661-4685

Department of Public Works

Land Use and Codes Enforcement
Telephone: 244-7763

Sewers Division
Telephone: 244-7773

State

Oahu

Commission on Population and
The Hawaiian Future
550 Halekauwila Street
Room 206
Honolulu, HI 96813
Telephone: 548-2328

Department of Agriculture
1428 South King Street
Honolulu, HI 96814
Information
Telephone: 548-2211

Marine Affairs Coordinator
1164 Bishop Street
Honolulu, HI 96813
Telephone: 548-6262

Department of Health
1250 Punchbowl Street
Honolulu, HI 96813
Telephone: 548-6505

Food and Drug
Telephone: 548-3280

Litter Control
Telephone: 548-3400

Noise Pollution
Telephone: 548-3075

Environmental Education Program
Office of Instructional Services
Department of Education
1270 Queen Emma Street
Room 1102
Honolulu, HI 96813
Telephone: 548-5914

Environmental Quality Control
Environmental Quality Control Commission
550 Halekauwila Street
Honolulu, HI 96813
Telephone: 548-6915

Department of Hawaiian Home Lands
550 Halekauwila Street
Honolulu, HI 96813
Telephone: 548-6450

Environmental Planning
645 Halekauwila Street
Honolulu, HI 96813
Telephone: 548-4362

Nutrition
Telephone: 548-6552

Environmental Programs
Telephone: 548-4139

Environmental Protection
and Health
Telephone: 548-6455

Health Education Office
Telephone: 548-5886

Noise and Radiation Branch
Telephone: 548-3075

Sanitation Branch
Telephone: 548-3225

Pollution Investigation and
Enforcement Branch
Department of Health
645 Halekauwila Street
2nd Floor
Honolulu, HI 96813
Telephone: 548-6355

Occupational Safety and Health
Division
677 Ala Moana Boulevard
Suite 910
Honolulu, HI 96813
Telephone: 548-4155

Department of Land and Natural
Resources
1151 Punchbowl Street
Honolulu, HI 96813
Telephone: 548-6550

Heritage Conservation and
Recreation Service
Telephone: 548-6461

Natural Area Reserves System
Office
Telephone: 548-2861

Conservation and Resources
Telephone: 548-5918

Fish and Game Division
Telephone: 548-4002

Forestry Division
Telephone: 548-2861

Land Management Division
Telephone: 548-7517

State Parks Outdoor Recreation
and Historic Sites Division
Telephone: 548-7455

Water and Land Development
Division
Telephone: 548-7539

Department of Planning and
Economic Development
Kamamalu Building
250 South King Street
Honolulu, HI 96813
Telephone: 548-4025

Aquaculture Development Program
Telephone: 548-5495

Land Use Division
Telephone: 548-2066

Science Policy and Technology Assessment Center
Telephone: 548-4195

State Energy Office
Telephone: 548-4080

Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813
Telephone: 548-3205

Statewide Transportation Planning
Telephone: 548-6526

Information Specialist
Telephone: 548-3233

State Foundation on Culture and the Arts
250 South King Street
Honolulu, HI 96813
Telephone: 548-4145

University of Hawaii
Honolulu, HI
Telephone: 948-8111

Information
Telephone: 948-8111

Aquarium
Telephone: 923-4725

Astronomy Institute
Telephone: 948-8312

Blue-Water Marine Laboratory Science Center
Telephone: 948-7930

Curriculum Research and Development Group
Telephone: 948-7961

Hawaii Geothermal Project
Telephone: 948-8301

Hawaii Natural Energy Institute
Telephone: 948-8890

Look Lab of Oceanographic Engineering
Telephone: 538-3381

Environmental Center
Telephone: 948-7361

Hawaii Geothermal Project
Telephone: 948-8788

Hawaii Geothermal Resources Assessment Program
Telephone: 948-7654

Marine Center
Telephone: 847-2661

Hawaii Institute of Marine Biology
Coconut Island Branch
Kaneohe
Telephone: 247-6631

International Tsunami Information Center
Telephone: 948-8082

Kewalo Marine Laboratory
Telephone: 531-3538

Law of the Sea Institute
Telephone: 948-6750

Lyon Arboretum
Telephone: 988-3177

Marine Option Program
Telephone: 948-8433

Marine Programs
Telephone: 948-8686

Meteorology-Solar Energy Project
Telephone: 948-7944

Oceanography
Telephone: 948-7633

Population Studies Program
Telephone: 948-8726

Sea Grant Marine Advisory Program
Telephone: 948-8191

Tropical Agriculture, College of Agriculture
Information
Telephone: 235-4190

Cooperative Extension Service
Telephone: 948-8228

State 4-H and Youth Program
Telephone: 948-8327

Urban and Regional Planning Program
Telephone: 948-7381

Water Resources Research Center
Telephone: 948-7847

Honolulu City and County

Board of Water Supply
635 South Beretania Street
Honolulu, HI 96813

Educational Materials and Tours of Facilities
Telephone: 548-6124
548-6126

Department of Land Utilization
650 South King Street
Honolulu, HI 96813
Telephone: 523-4414

Department of General Planning
650 South King Street
Honolulu, HI 96813

Environmental and Plans Assessment Branch
Telephone: 523-4537

Department of Parks and Recreation
650 South King Street
Honolulu, HI 96813
Telephone: 523-4181

Information Counter
Telephone: 523-4131

Flood Hazard Districts
Telephone: 523-4247

Historic Cultural and
Scenic Districts
Telephone: 523-4252

Land Use Controls Division
Telephone: 523-4133

Environment Impact Statements
Telephone: 523-4077

Zoning Division
Telephone: 523-4248

Parks Division
Telephone: 523-4521

Recreation Division
Telephone: 523-4631

Water Safety
Telephone: 922-3888

Permit Section
Telephone: 523-4525

Honolulu Zoo
151 Kapahulu Avenue
Honolulu, HI 96813
Telephone: 923-7723

Department of Public Works
650 South King Street
Honolulu, HI 96813

Environmental Engineer
Telephone: 523-4150

Chief Refuse Collection and
Disposal Division
Telephone: 523-4746

Chief Wastewater Management Division
Telephone: 523-4321

Department of Transportation
Services
650 South King Street
Honolulu, HI 96813
Telephone: 523-4529

Mass Transit Planning
Telephone: 523-4156

Traffic Engineering Planning
Telephone: 523-4199

Traffic Safety Education
Telephone: 523-4245

Non-Governmental Organizations

American Association for the
Advancement of Science
1776 Massachusetts Avenue, N.W.
Washington, D.C. 20036
Telephone: (202) 467-4463

American Association of State
Colleges and Universities
Nicholls State University
Thibodaux, LA 70301
Telephone: (504) 446-8111

American Federation of Teachers
10311 East 42nd Street
Kansas City, MO 64133
Telephone: (816) 483-0753

American Forest Institute, Inc. (The)
Project Learning Tree
1619 Massachusetts Avenue, N.W.
Washington, D.C. 20036
Telephone: (202) 797-4530

American Gas Association, Inc.
Educational Services
1515 Wilson Boulevard
Arlington, VA 22209
Telephone: (703) 841-8400

American Institute of Architects
Director of Environmental
Education
1735 New York Avenue, N.W.
Washington, D.C. 20006
Telephone: (202) 785-7203

American Public Transit
Association
1100 17th Street, N.W.
Washington, D.C. 20036
Telephone: (202) 331-1100

Association for Environmental
and Outdoor Education
253 Johnstone Court
San Rafael, CA 94903
Telephone: (415) 556-4366

Center for Environmental
Education
1925 K Street, N.W.,Suite 206
Washington, D.C. 2006
Telephone: (202) 466-4996

Center for Information on
America
Post Office Box C
Washington, CT 06793
Telephone: (203) 868-2602

Citizens Against Noise
548 Kapahulu Avenue
Honolulu, HI 96815
Hotline
Telephone: (808) 735-3506

Communications Satellite
Corporation
Information Office
950 L'Enfant Plaza, S.W.
Washington, D.C. 20024

Consumers Union
Mount Vernon, N.Y. 10550

American Home Economics Association
2010 Massachusetts Avenue, N.W.
Washington, D.C. 20036
Telephone: (202) 862-8300

American Nature Study Society
Audubon Center in Greenwich
613 Riversville Road
Greenwich, CT 06830
Telephone: (203) 869-5272

American Society for Environmental
Education
33 Mill Road
Post Office Box R
Durham, NH 03824
Telephone: (603) 868-5700

Boy Scouts of America
Camping and Conservation Service
North Brunswick, N.J. 08902
Telephone: (201) 249-6000

Center for Global Perspectives
218 East 18th Street
New York, N.Y. 10003
Telephone: (212) 475-0850

Chamber of Commerce of Hawaii
Dillingham Building
Honolulu, HI 96813

Clean Hawaii
645 Kapiolani Boulevard
Honolulu, HI 96813
Telephone: 531-1145

Conservation Education Association
Fish and Wildlife Service
U.S. Department of the Interior
Washington, D.C. 20240
Telephone: (202) 343-4545

Edison Electric Institute
Educational Services
1111-19th Street, N.W.
Washington, D.C. 20036
Telephone: (202) 862-3800

Environment-Population
Education Services
c/o Aces
800 Dixwell Avenue
New Haven, CT 06511

ERIC (Educational Resources
Information Center)
Clearinghouse for Social
Studies/Social Science
Education
855 Broadway
Boulder, CO 80302
Telephone: (303) 492-8434

Foresta Institute for Ocean
and Mountain Studies
6205 Franktown Road
Carson City, NV 89701
Telephone: (702) 882-6361

Girl Scouts of the U.S.A.
Wildlife Project
830 Third Avenue
New York, N.Y. 10022
Telephone: (212) 940-7500

Hawaii Council of Camp Fire, Inc.
200 North Vineyard Boulevard
Room 302
Honolulu, HI 96817

Hawaii Visitors Bureau
Waikiki Business Plaza
2270 Kalakaua Avenue
Honolulu, HI 96815

Institute of Society, Ethics and
the Life Sciences
Hastings Center
623 Warburton Avenue
Hatings-on-Hudson, NY 10706
Telephone: (914) 478-0500

The Environmental Fund
1302 18th Street, N.W.
Washington, D.C. 20036
Telephone: (202) 293-2548

ERIC/SMEAC Center for Science, Mathematics,
and Environmental Education
1200 Chambers Road
Columbus, OH 43212
Telephone: (614) 422-6717

Garden Club of America (The)
598 Madison Avenue
New York, N.Y. 10022

Greenpeace Hawaii
913 Halekauwila Street
Honolulu, HI 96814
Telephone: 573-9505

Hawai'i League of Women Voters

Honolulu
116 South King Street
Suite 504
Honolulu, HI 96813
Telephone: 531-7448

Hilo
Post Office Box 665
Hilo, HI 96720

Kapa'a
R.R. 1
Box 293-E-4
Kapa'a, HI 96746

Humane Society of the United States
The Norma Terris Humane
Education Center
Post Office Box 98
East Haddam, CT 06423
Telephone: (203) 434-8666

International Council on Health,
Physical Education and Recreation
Secretary General
1201 Sixteenth Street, N.W.
Washington, D.C. 20036
Telephone: (202) 833-5499

International Planned Parenthood Federation
105 Madison Avenue
New York, NY 10016

Izaak Walton League of America
1800 North Kent Street
Suite 806
Arlington, VA 22209
Telephone: (703) 528-1818

League of Women Voters of the United States
1155 Edgewood Avenue
Madison, WI 53711
Telephone: (608) 257-2938

Learning Resources in International Studies
Suite 1231
60 East 42nd Street
New York, N.Y. 10017
Telephone: (212) 972-9877

Life of the Land
250 S. Hotel Street
Room 211
Honolulu, HI 96813
Telephone: 521-1300

Massachusetts Audubon Society
Hatheway Environmental Education Institute
Lincoln, MA 01773
Telephone: (617) 259-9500

National Association of Conservation Districts
Post Office Box 297
Solebury, PA 18963
Telephone: (215) 297-5675

National Association for Environmental Education
Virginia Polytechnic Institute and State University
Biology Division
Blacksburg, VA 24061
Telephone: (703) 961-5442

National Audubon Society
Schlitz Audubon Center
1111 East Brown Deer Road
Milwaukee, WI 53217
Telephone: (414) 352-2880

National Catholic Education Association
Suite 350
1 Dupont Circle
Washington, D.C. 20036
Telephone: (202) 293-5954

National Council for Geographic Education
Department of Social Science Education
Dudley Hall
University of Georgia
Athens, GA 30602
Telephone: (404) 542-7265

National Geographic Society
17th and M Streets, N.W.
Washington, D.C. 20036

National Education Association
Instruction and Professional Development
1201 16th Street, N.W.
Washington, D.C. 20036
Telephone: (202) 833-4336
(202) 833-4000

National Parks and Conservation Association
1701 Eighteenth Street, N.W.
Washington, D.C. 20036
Telephone: (202) 265-2717

National Wildlife Federation
1412 16th Street, N.W.
Washington, D.C. 20036
Telephone: (202) 797-6800

Education Division
8975 Leesburg Pike
Vienna, VA 22180
Telephone: (703) 790-4353

Nature Conservancy (The)
1800 North Kent Street
Suite 800
Arlington, VA 22209
Telephone: (704) 841-5300

Outdoor Circle (The)
200 North Vineyard Boulevard
Honolulu, HI 96817

Overseas Development Council
1717 Massachusetts Avenue, N.W.
Washington, D.C. 20036
Telephone: (202) 234-8701

Planned Parenthood Federation of America
810 Seventh Avenue
New York, N.Y. 10019
Telephone: (212) 541-7800

Population Association of America
Post Office Box 14182
Benjamin Franklin Station
Washington, D.C. 20044
Telephone: (202) 393-3252

Population Council
One Dag Hammerskjold Plaza
New York, N. Y. 10017

Population Crisis Committee
Suite 550
1120 19th Street, N.W
Washington, D.C. 20036
Telephone: (202) 659-1833

Population Institute
110 Maryland Avenue, N.E.
Washington, D.C. 20002
Telephone: (202) 544-3300

Population Reference Bureau, Inc.
1337 Connecticut AVenue, N.W.
Washington, D.C. 20036
Telephone: (202) 785-4664

Sierra Club
530 Bush Street
San Francisco, CA 94108
Telephone: (415) 981-8634

Sierra Club Hawaii Chapter
1212 University Avenue
Honolulu, HI 96826
Telephone: 946-8494

Smithsonian Institution
1000 Jefferson Drive S.W.
Washington, D.C. 20560
Telephone: (202) 357-1300

State Departments of Education
and Other State-Based Sources
ERIC/SMEAC
Ohio State University
1200 Chambers Road
3rd Floor
Columbus, OH 43212
Ask for A Directory of Projects and Programs in Environmental Education and Environmental Education 1979: A State-by-State Report $6.50 each

Soil Conservation Society of America
3058 North Pollard Street
Arlington, VA 22207
Telephone: (202) 447-5063

United Auto Workers/Conservation
Department
8000 East Jefferson Avenue
Detroit, MI 48214
Telephone: (313) 926-5271

United Methodist Board of Church and Society
Department of Population
110 Maryland Avenue, N.E.
Washington, D.C. 20002
Telephone: (202) 488-5637

United Nations Educational, Social,
and Cultural Organization (UNESCO)
7 place de Fontenoy, 75700
Paris, France

United Nations Environmental Programme (UNEP)
Post Office Box 30552
Nairobi, Kenya
or
New York Liaison Office
Post Office Box 20
New York, N.Y. 10017

United Nations Food and Agriculture Organization (UNFAO)
Viale della Terme di Caracalla 00100
Rome, Italy

United Nations Fund for Population Activities (UNFPA)
485 Lexington Avenue
New York, N.Y. 10017
Telephone: (212) 754-1234

United Nations International Labor Organization (UNILO)
1750 New York Avenue, N.W.
Washington, D.C. 20006
Telephone: (202) 634-6335

Urban Life Population Education Institute (ULPEI)
2418 Saint Paul Street
Baltimore, MD 21218
Telephone: (301) 396-6627
(301) 396-6624

U.S. News and World Report
2300 N Street, N.W.
Washington, D.C. 20037

Western Regional Environmental Education Council
State Department of Education
721 Capitol Mall
Sacramento, CA 95814
Telephone: (916) 322-4018

Wildlife Management Institute
709 Wire Building
1000 Vermont Avenue, N.W.
Washington, D.C. 20005
Telephone: (202) 347-1774

World Bank
1818 H Street, N.W.
Washington, D.C. 20433

World Education
1414 Avenue of the Americas
New York, N.Y. 10019

Worldwatch Institute
1776 Massachusetts Avenue, N.W.
Washington, D.C. 20036
Telephone: (202) 452-1999

Zero Population Growth (ZPG)
1346 Connecticut Avenue, N.W.
Washington, D.C. 20036
Telephone: (202) 785-0100

Educational Guides Related to Environmental Education Produced by Office of Instructional Services, Department of Education

Environmental Education Program

A Framework for Environmental Education in the Public Schools of Hawaii, September, 1977, TAC 77-4277

A Compendium: Campsites and One-Day Visitation Sites in the State of Hawaii, 1977, updated 1980, RS 80-9835

Environmental Education Supplementary Instructional Guide, Elementary Level--The Litter Problem, September, 1979, RS 79-8218

Environmental Education Supplementary Instructional Guide, Secondary Level--The Litter Problem, September, 1979, RS 79-8219

Field Keys to Common Hawaiian Marine Animals and Plants, 1978, updated 1980, RS 80-9279

Coral, A Hawaiian Resource (draft) 1978, updated 1980

Environmental Education Supplementary Instructional Guide - Sixth Grade Level (draft)

Environmental Education Supplementary Instructional Guides, Energy Use and the Environment*

Art Module
Health Module
Mathematics Module
Music Module
Physical Education Module
Agriculture Module
Asian, European, and Pacific Languages Module
Business Module
Industrial Arts Module
Industrial Technical Module
*Home Economic Module
*Basic Practical Arts Module
*Science Module
*Kindergarten Module
*First Grade Module
*Second Grade Module
*Third Grade Module
*Fourth Grade Module
*Fifth Grade Module
*Sixth Grade Module
*Social Studies
*Language Arts

*As of January 31, 1981, modules with the asterisks have been completed and printed.

Mathematics Program

Mathematics Program Guide, Grades K-6, 1978, RS 78-5254

Mathematics Program Guide, Grades 7-12, 1978, RS 78-5255

Physical Education Program

Physical Education Program Guide, K-12, 1979, RS 79-7794

Science Program

Science Curriculum Guide, Grades K-6, 1977, TAC 77-3689

Science Curriculum Guide, Grades 7-9, 1977, TAC 77-4733

Science Curriculum Guide, Grades 9-12, 1978, RS-6694

Health Program

Health Education Guide for the Public Schools in Hawaii - An Instructional Guide, Kindergarten-Grade 6, 1976 (to be revised) TAC 76-2096

Health Education Instructional Guide, Grades 7-8, 9-12, 1978, RS 80-9297

Social Studies Program

Elementary Social Studies Program Guide, (Draft), 1980, RS 80-9823

Secondary Social Studies Program Guide, 1979, RS 79-8168

Art Program

Hawaii Art Education Program Guide, 1978, RS 78-5740

Music Program

K-12 Music Education Program Guide, June, 1979, RS 79-7613

Language Arts Program

Language Arts Guide, K-12, 1979, RS 79-7609

Language Arts Strategies for Basic Skills K-12, 1979, RS 79-7520

Comprehension in the Content Area 3-6 and 7-12, 1979, RS 79-7522

Basic Practical Arts Program

Basic Practical Arts Course Guide, July, 1976, TAC 76-1681

Asian, European, and Pacific Languages Program

Chinese Language Program Guide, 1980, RS 80-9633

Foreign Language Program Guide, 1977, RS 77-4295

French Language Program Guide, 1979, RS 79-7105

German Language Program Guide, 1979, RS 79-7539

Hawaiian Language Program Guide, 1980, RS 80-9396

Japanese Language Program Guide, 1979, RS 79-8161

Russian Language Program Guide, 1980, RS 80-9910

Spanish Language Guide, 1978, RS 78-6719

Japanese Resource Materials Guide, 1979, RS 79-8601

Agriculture Program

Ornamental Horticulture Resource Guide, 1976, TAC 76-2684

Agriculture Technology Resource Guide, 1976, TAC 76-2685

Agriculture Arts Course Guide, 1976, TAC 74-817[illegible]

Industrial Technical Program

Instructional Guide for Building Construction Technology Occupational Programs, June, 1975, TAC 75-9667

Instructional Guide for Drafting Technology Occupational Programs, June, 1975, TAC 75-9440

Instructional Guide for Electronics Technology Occupational Programs, May, 1975, TAC 75-9294

Instructional Guide for Graphic Arts Technology Occupational Programs, June, 1975, TAC 75-9400

Instructional Guide for Metals Processing and Fabrication Technology Occupational Programs, June, 1975, TAC 75-9661

Instructional Guide for Power and Automotive Occupational Programs, April, 1975, TAC 75-9254

Industrial Arts Program

Industrial Arts Instructional Guide for Manufacturing - 1, Reprint 1977, TAC 77-4286

Industrial Arts Instructional Guide for Construction - 2, 1975, TAC 74-8737

Industrial Education Instructional Guide for Graphic Arts - 3, 1974, TAC 74-7837

Industrial Education Instructional Guide for Electricity/Electronics - 4, 1973, TAC 73-6164

Industrial Education Instructional Guide for Designing and Drafting - 5, Reprint 1977, TAC 74-7986

Industrial Arts Instructional Guide for Power - 6, Reprint 1978, TAC 75-0469

Industrial Education Curriculum Guide, Reprint February, 1974, TAC 73-6329

Industrial Education Safety Instructional Guide, 1973, TAC 73-5890

Home Economics Program

Home Economics Curriculum Guide for Hawaii, 1970, TAC 70-1414

A Resource Unit in the Area of Management and Family Economics, 1975, TAC 75-9877

Home Economics Resource Unit in the Area of Clothing and Textiles, 1975, TAC 75-0445

Food Education and Service Training Program Guide, 1973, TAC 73-6298

Business Program

Resource Guide for Basic Business, 1976, 76-1410

Resource Guide for Distributive Education, 1976, 76-1411

Resource Guide for Office Education, 1976, 76-1409

Guidance Program

Foundation Program: Career Education and Guidance, 1980, RS 80-9146

Foundation Guidance Program Guide K-12, 1980, RS 80-9146

Career Education Program

Hawaii Career Development Continuum, K-3, 1974, TAC 74-8226

Hawaii Career Development Continuum, 4-6, 1974, TAC 74-8226

Hawaii Career Development Continuum, 7-9, 1974, TAC 74-8226

Hawaii Career Development Continuum, 10-12, 1974, TAC 74-8226

Career Education in Hawaii, Handbook of Community Resources and Visitation Sites, 1980, RS 80-9789

Foundation Program: Career Education and Guidance, 1980, RS 80-9146

Values Program

Values Education in the Public Schools in Hawaii, 1972, TAC 72-5368, revised 1973, TAC 73-5570

Library Program

Study Skills Related to Library Use: A K-12 Curriculum Guide for Teachers and Librarians, 1978

Integrating Library Skills Into Content Areas: Sample Units and Planning Forms, 1979, RS 79-8431

Improving Library/Study Skills Instruction: An Application of the Instructional Development Model, 1980 (draft), RS 80-9719

Nutrition Program

No printed guides as of January, 1981.

Hawaiian Studies Program

Hawaiian Studies Program Guide (Draft), 1981

Environmentally Related Instructional Materials Locally Produced

Coastal Problems and Resource Management

A Secondary Social Studies Course.
Curriculum Research and Development Group
University of Hawaii at Manoa

Hawaii Nature Study Program

An Elementary Nature Program.
Curriculum Research and Development Group
University of Hawaii at Manoa

Foundation Approach to Science Teaching

A Secondary Science Program.
Curriculum Research and Development Group
University of Hawaii at Manoa

High School Marine Science Studies

A Secondary Marine Science Course.
Curriculum Research and Development Group
University of Hawaii at Manoa

Annotated List of Journals and Magazines

AMERICAN NATURALIST is a bi-monthly publication dealing with advancement and correlation of the biological sciences. Marine topics include flora and fauna, ecology, and pollution.
American Society of Naturalists, University of Chicago Press, 5801 Ellis Avenue, Chicago, IL 60637

AQUACULTURE is published eight times a year and deals with the theories and applications of industrial sea farming.
Elsevier Scientific Publishing Co., Box 211, Amsterdam, Netherlands

AQUATIC BOTANY is an international scientific journal dealing with applied and fundamental research on submerged, floating and emergent plants in marine and fresh water ecosystems.
Elsevier Scientific Publishing Co., Box 211, Amsterdam, Netherlands (Elsevier North-Holland, Inc., New York, 52 Vanderbilt Avenue, New York, N.Y. 10017) C. Den Hartog, Editor

ASTRONOMY is a monthly publication providing a variety of articles on the field of astronomy.
Astronomy, 411 East Mason Street, Post Office Box 92788, Milwaukee, WI 53202

AUDUBON, the magazine of the National Audubon Society, deals with all aspects of the natural environment. The magazine contains a wide range of topics, often with marine subjects pertaining to wetlands and marine flora and fauna. Articles deal mainly with behavioral patterns. Artwork and photography are excellent.
National Audubon Society, 950 Third Avenue, New York, N.Y. 10022

AUSTRALIAN FISHERIES contains articles pertaining to all phases of marine life and research.
Published by Department of Agriculture, Fisheries Division, Canberra A.C.T. Australia, P. C. Pownall, Editor

AUSTRALIAN JOURNAL OF MARINE AND FRESHWATER RESEARCH is a journal that describes research in marine, estuarine or freshwater areas, including oceanographic topics.
Editor-in-Chief, Editorial and Publications Service, CSITO, Post Office Box 89, East Melbourne, Victoria 3002, Australia

BIOSCIENCE is issued twice monthly and deals with a wide range of biological and chemical subjects. Marine articles deal with the ocean systems and pollution. Scholarly journal.
1401 Wilso Boulevard, Arlington, VA 22209

CALIFORNIA FISH AND GAME deals with marine life in regard to effects of pollution and various other topics related to wildlife in California.
Robin A. Collins, Editor, 350 Golden Shore, Long Beach, CA 90802

CALYPSO LOG DISPATCH is the publication of The Cousteau Society and presents a variety of articles dealing with marine and aquatic environments. Issued eight times per year.
Calypso Log, The Cousteau Society, Inc., 8430 Santa Monica Boulevard, Los Angeles, CA 90069

CANADA, FISHERIES RESEARCH BOARD, JOURNAL, contains research articles, notes, and critical reviews in field fisheries management and technology, ocean science and aquatic environment relevant to Canada. Issued monthly.
J. C. Stevenson, Editor, Editorial Office, Ottawa, Canada, KIA 0S9

CHESAPEAKE BAY JOURNAL is the publication of the Chesapeake Bay Foundation, an organization involved with environmental education, awareness, and conservancy for the Chesapeake Bay Region.
Chesapeake Bay Foundation, Inc., Box 1709, Annapolis, MD 21404

CHESAPEAKE SCIENCE is a regional journal of natural resources. Topics of articles include pollution, ecology, flora and fauna, and geology.
University of Maryland Center for Environmental and Estuarine Studies, Chesapeake Biological Laboratory, Solomons, MD 20688

COASTAL ZONE MANAGEMENT JOURNAL discusses management including economic and ecological problems. Published quarterly.
M. Hershman, Editor, Institute for Marine Studies University of Washington, Seattle, WA 98105

COMMERCIAL FISH FARMER AND AQUACULTURE NEWS contains up-to-the-minute news on all aspects of aquatic animals, timely reports, columns, guest articles and features on the changing aquaculture industry, new product information, calendar of events, meetings and conventions about aquaculture, buyer's guide. Published bi-monthly.
Catfish Farmers of America, Box 2451, Little Rock, AR 72203,
M. Moore, Editor

COPEIA is a journal published quarterly by the American Society of Ichthyologists and Herpetologists. It deals with biological topics as related to the field of ichthyology and herpetology.
c/o National Marine Fisheries Service, National Museum of Natural History, Washington, D.C. 20560

CURRENT ENERGY AND ECOLOGY is a environmental education magazine suitable for upper elementary through intermediate school students. Each issue presents information on a variety of environmental topics. Published monthly during the school year.
Curriculum Innovations, Inc., 501 Bank Lane, Highwood, IL 60040

CURRENT HEALTH is published monthly during the school year and is written for secondary level students. Articles include many environmentally-related health topics. Curriculum Innovations, Inc., 3500 Western Avenue, Highland Park, IL 60035

CURRENT, THE JOURNAL OF MARINE EDUCATION is the publication of the National Marine Education Association. The journal reports on marine education activities in many states. Published quarterly.
College of Education, University of Delaware, Newark, DE 19711,
Dr. Les Picker, Editor

DELAWARE CONSERVATIONIST is issued quarterly by the Delaware Department of Natural Resources and Environmental Control, Dover, DE 19901. The magazine has articles on all aspects of Delaware's environment: wetlands and other habitats, recreational areas, geology, flora, fauna, and history.

ECOLOGY deals with all forms of life in their relation to the natural environment. Subjects of marine interest include ecology, pollution, flora and fauna. Scholarly journal.
C. G. Jackson, Jr., Editor, San Diego Natural History Museum, Post Office Box 1390, San Diego, CA 92112

ELISHA MITCHELL SCIENTIFIC SOCIETY JOURNAL is a journal published quarterly and contains papers of a wide range of topics in biology, especially botany.
Executive Editor, Department of Botany, University of North Carolina, Coker Hall 010-A, Chapel Hill, N.C. 27514

ENVIRONMENT is published ten times a year. Articles are technical and deal mainly with technology and its effect on the environment.
Editor, 560 Trinity Avenue, Saint Louis, MO 63130

ENVIRONMENTAL SCIENCE AND TECHNOLOGY is a trade journal of the American Chemical Society and is published monthly. It is a collection of technical papers and articles on industrial-environmental conflicts. Occasional articles pertain to marine and fresh water estuarine pollution.
Subscription Service Department, American Chemical Society, 1155 Sixteenth Street, N.W., Washington, D.C. 20036

ESTUARINE AND COASTAL MARINE SCIENCE is published seasonally and deals with all aspects of the coastal marine environment.
Academic Press, Inc., 111 Fifth Avenue, New York, N.Y. 10003

FISHING GAZETTE is a journal containing articles about fisheries production, distribution and progress.
Fishing Gazette Publishing Corp., 461 8th Avenue, New York, N.Y. 10001

THE FUTURIST is a bi-monthly magazine on environmental matters with a particular emphasis on futuristics.
World Future Society, Post Office Box 30369, Bethesda Branch, Washington, D.C. 20014

HAWAII HUMPBACK is a quarterly magazine with a wide variety of articles on the natural sciences.
Straight Ahead Publishing, RR 1, Box 276, Wailuku, Maui, HI 96793

INTERNATIONAL JOURNAL OF CRUSTACEAN RESEARCH is a journal which publishes international studies of crustacea written in English, French, or German on all branches of zoology except biochemistry dealing with Crustacea.
E. J. Brill, Publisher, Leiden, Netherlands

INTERNATIONAL WILDLIFE is a bi-monthly publication of the National Wildlife Federation containing many photographs and articles on flora and fauna and conservation efforts worldwide.
National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036

JOURNAL OF EXPERIMENTAL MARINE BIOLOGY AND ECOLOGY presents articles on all aspects of marine ecology including the littoral, inshore, offshore and deep sea, zones with special emphasis on the physiological, biochemical and behavior relationships of organisms to their environment.
Elsevier Scientific Publishing Co., Box 211, Amsterdam, Netherlands

JOURNAL OF FISH BIOLOGY is a monthly journal which covers all aspects of fish biology and offers a wide spectrum of information which acquaints readers with the advances in all aspects of fishery science.
Editor: D. Jolly, Huntington Research Centre, Huntington, PE 18 6ES, England

JOURNAL OF MARINE EDUCATION contains marine news related to education, marine articles, media and curriculum sections. Published quarterly.
Aegir Corp., Post Office Box 3085, Newport Beach, CA 92663, 425 North Newport Boulevard Newport Beach, CA 92660

JOURNAL OF MARINE RESEARCH deals with a broad range of marine topics: hydrogeology, oceanography, ecology, pollution, industrial application, and mariculture.
Box 2161, Yale Station, New Haven, CT 06520

JOURNAL OF NUTRITION EDUCATION is published by the Society for Nutrition Education and presents a variety of articles on nutrition and related environmental effects on nutrition.
Published quarterly. Society for Nutrition Education, 2140 Shattuck Avenue, Suite 1110, Berkeley, CA 94704

JOURNAL OF RESEARCH is a government published journal containing some articles on environmental matters.
Superintendent of Documents, Government Printing Office, Washington, D.C. 20402

JOURNAL OF WATER POLLUTION CONTROL FEDERATION provides technical data and reports on various aspects of water pollution and is an excellent source of facts and figures.
3900 Wisconsin Avenue, N.W., Washington, D.C. 20016

LIMNOLOGY AND OCEANOGRAPHY is a bi-monthly publication of the American Society of Limnology and Oceanography, Inc. It includes topics on limnology and oceanography.
Atmospheric and Oceanic Sciences, University of Michigan, 2455 Hayward, Ann Arbor, MI 48109

MALACOLOGIA publishes papers on research regarding mollusks.
George M. Davis, Editor, Department of Malacology, Academy of Natural Sciences of Philadelphia, 19th Street and Parkway, Philadelphia, PA 19103

MARINE BEHAVIOR AND PHYSIOLOGY is a journal aimed at publishing papers relevant to the field of behavior and physiological, anatomical and morphological bases exhibited by marine organisms.
Gordon and Breach Science Publishing Ltd., 42 William IV Street, London WC2, England

MARINE BIOLOGY is a journal containing contributions in the areas of biological oceanography, cultivation of marine organisms, experimental ecology and physiology, ecological dynamics, evolution and biology as related to the marine environment. Published four times yearly.
L. Siegel, Advertising, Springer-Verlag New York, Inc., 175 5th Avenue, New York, N.Y. 10010

MARINE CHEMISTRY reports on a wide range of chemical subjects pertaining to the marine environment.
Elsevier Scientific Publishing Co., Box 211, Amsterdam, Netherlands

MARINE FISHERIES REVIEW is a journal published bi-monthly which deals with international fishery news and data.
J. D. Harrell, Editor, NMFS Scientific Publications Staff, Room 450, 1107 NE 45th Street, Seattle, WA 98105

MARINE GEOLOGY is published twice a year and deals with marine geology, geochemistry, and geophysics.
Elsevier Scientific Publishing Co., Box 211, Amsterdam, Netherlands

MARINERS WEATHER LOG is a journal which contains weather logs, climatology reports and news problems of interest.
Elwyn E. Wilson, Editor, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Data Service, Washington, D.C. 20235

MARINE TECHNOLOGY SOCIETY JOURNAL publishes various aspects of sea ecology, ie. fisheries and resources. Published 10 times yearly.
D. Walsh, Editor, MTS, 1730 M Street, N.W., Suite 412, Washington, D.C. 20036

MARITIMES, a publication of the University of Rhode Island Graduate School of Oceanography, covers a wide range of subjects, including marine economics, fishing and mariculture, pollution, history, biology, and geology.
Pell Library, Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02991 Free.

NATIONAL GEOGRAPHIC is the publication of the National Geographic Society dealing with all aspects of the universe. Articles and photography are always excellent. Frequent marine topics deal with flora and fauna, mariculture, coastal ecology, and humans' effects on the natural system.
National Geographic Society, Seventeenth and M Street, N.W., Washington, D.C. 20036

NATIONAL WILDLIFE is a bi-monthly publication of the National Wildlife Federation. It deals with the preservation and management of the natural environment. Marine articles deal with flora and fauna and restoration and preservation of the natural environment.
1412 16th Street, N.W., Washington, D.C. 20036

NATURAL HISTORY MAGAZINE contains many aspects of nature and the environment including marine. Published 10 times a year.
American Museum of Natural History, Central Park West at 79th Street, New York, N.Y. 10024

NATURE is the British publication dealing with all aspects of the universe. Marine topics include geology, flora and fauna, oceanography, ecology and pollution.
Macmillan Journals, Ltd., 4 Little Essex Street, London WC2R 3LF, United Kingdom

NAUTILUS is a journal devoted to malacology and interests of conchologists. Published quarterly.
R. Tucker Abbott, Editor, American Malacologists, Inc., Box 4208, Greenville, DE 19807

NEW YORK FISH AND GAME JOURNAL presents results of research and management studies in New York on subjects relating to fish and wildlife problems. Free to scientific institutions. Published semi-annually.
Robert W. Darrow, Editor, New York State Department of Environmental Conservation, Wildlife Resources Center, Delmar, N.Y. 12054

NUTRITION TODAY is a bimonthly publication of the Nutrition Today society and contains numerous articles on nutrition and the relationship of nutrition and environment. Nutrition Today, Inc., 703 Giddings Avenue, Post Office Box 1829, Annapolis, M.D. 21404

OCEAN DEVELOPMENT AND INTERNATIONAL LAW is a journal of marine affairs. Crane, Russak and Co., Inc., 347 Madison Avenue, New York, N.Y. 10017

OCEAN INDUSTRY is a periodical specialized for the ocean/marine operations. Gulf Publishing Co., Box 2608 Houston, TX 77001

OCEANOLOGY is a journal published bi-monthly that deals with oceanology, with sections of physics, chemistry, biology and geology. American Geophysical Union, 1909 K Street, N.W., Washington, D.C. 20006

OCEANS is a bi-monthly publication of the Oceanic Society. Articles are well illustrated and cover such subjects as the history, science, and geography of the sea. The Ocean Society, Post Office Box 10167, Des Moines, IA 50340

OCEANUS usually devotes each issue to one particular aspect of marine science. Previous subjects have included estuaries, marine pollution, food from the sea, and sea sounds. Woods Hole Oceanographic Institution, Oceanus Subscription Department, 2401 Revere Beach Parkway, Everett, MA 02149

OIKOS, A JOURNAL OF ECOLOGY contains world-wide issues of ecological developments and effects. Published 6 times a year. P. Brinck, Editor, issued by Scandinavian Society OIKOS, Department of Animal Ecology, Ecology Building S-223 62 Lund, Sweden

OPHELIA, INTERNATIONAL JOURNAL OF MARINE BIOLOGY discusses wide range of biologically related topics. Published semi-annually. A. M. Christensen, Editor, Marine Biology Laboratory, Helsingor, Denmark

PROGRESS IN OCEANOGRAPHY is a bi-monthly publication containing papers concerned with the effects of waste water on the environment and water analysis by chemical, biological and physical means. Pergamon Press, Maxwell House, Fairview Park, Elmsford, N.Y. 10523

RANGER RICK'S NATURE MAGAZINE is geared to the young reader with excellent introductory articles on all aspects of nature. The marine topics provide an excellent exposure to the marine environment. National Wildlife Federation, Attention Subscription Department, 1412 Sixteenth Street, N.W., Washington, D.C. 20036

SALT WATER AQUARIUM is published bi-monthly and deals with the set-up, maintenance, and improvement of marine aquaria. Articles provide excellent insight into aquarium management for the novice, as well as tips on locations for specimen collecting. Coral Reef Exhibits, Box 1005, Kendall Drive, Miami, FL 33156

SCIENCE is a journal of the American Association for the Advancement of Science and deals with all aspects of the universe. Marine topics include marine geology, oceanography, pollution, and ecology. 1515 Massachusetts Avenue, N.W. Washington, D.C. 20005

SCIENTIFIC AMERICAN is published monthly and deals with a wide range of science topics. A whole issue may be devoted to a specific subject, or many subjects may be treated in any one issue. Marine environment articles are on such subjects as marine geology, food production, marine technology, and marine resources.
Scientific American, 1415 Madison Avenue, New York, N.Y. 10017

SEA FRONTIERS, a publication of the International Oceanographic Foundation, contains well illustrated articles of general interest on the marine environment.
The International Oceanographic Foundation, 3979 Rickenbacker Causeway, Virginia Key, Miami, FL 33149

SEA GRANT 70's is a report of research activities, meetings and publications sponsored by the National Oceanic and Atmospheric Administration Sea Grant Program.
Texas A & M University, College Station, TX 77843

SEA HISTORY is a journal of the National Maritime Historical Society with articles on the history of ships, seaports, maritime professions, and marine art.
Fulton Ferry Landing, 2 Fulton Street, Brooklyn, N.Y. 11201

SEA SECRETS, published by the International Oceanographic Foundation, provides answers to various marine related questions submitted by readers. It also contains information on new publications, events, and recent advances in the marine sciences.
3979 Rickenbacker Causeway, Virginia Key, Miami, FL 33149

SEA TECHNOLOGY is a journal published monthly and is "the industry's recognized authority for design, engineering and application of equipment and services in the marine environment."
Compass Publisher, Inc., Suite 1000, 1117 N. 19th Street, Arlington, VA 22209

SEADRIFTS includes recent marine-related news clippings from Delaware newspapers, the New York Times, and the Wall Street Journal. Published monthly.
Delaware Sea Grant College Program, College of Marine Studies, University of Delaware, Newark, DE 19711

SHORE AND BEACH is a journal of the American Shore and Beach Preservation Association containing articles dealing with protection of shore areas.
J. W. Johnson, Editor, 412 O'Brian Hall, University of California, Berkeley, CA 94720

SIERRA CLUB BULLETIN is the journal of the Sierra Club with articles dealing with environmental conflicts. Marine topics include endangered species, pollution, and utilization of resources.
Sierra Club, 530 Bush Street, San Francisco, CA 94108

SOIL CONSERVATION is the official magazine of the Soil Conservation Service and contains a variety of articles related to protection and conservation of the land. Published monthly.
Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

UNDERSEA TECHNOLOGY is a trade journal for undersea industries covering such subjects as ocean engineering, marine environmental science, and undersea defense.
Compass Publications, Inc., Suite 1000, 1117 N. 19th Street, Arlington, VA 22209

UNFPA JOURNAL: POPULI is a quarterly journal containing many human interest articles on population.
United Nations Fund for Population Activities (UNFPA), 485 Lexington Avenue, New York, N.Y. 10017

WATER RESEARCH is a monthly journal containing papers concerned with the effects of waste water on the environment water through analysis by chemical, biological and physical means.
Pergamon Press, Maxwell House, Fairview Park, Elmsford, N.Y. 19523

Annotated List of Newsletters, Bulletins, and Papers

AGID NEWS (Association of Geoscientists for International Development). L. A. Heindl, Editor, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418 Irregular. Free.

AIR/WATER POLLUTION REPORT, Business Publishers, Inc., Box 1067, Blair Station, Silver Spring, MD 20910 Published weekly.
News about environmental pollution: its occurrence, relevant acts and laws, products for pollution control, and methods taken for controlling pollution. The marine environment is included.

ALASKA SEAS AND COASTS, University of Alaska, Alaska Sea Grant Program, 707 A Street, Anchorage, AK 99501 Five issues yearly.
Published for the benefit of Alaska fishermen, it includes information about activities of commercial institutions and government agencies concerned with the management of Alaska fisheries.

ALASKA FISHERMAN, United Fishermen of Alaska, Box 191, Juneau, AK 99510
News especially about legal or political events affecting Alaska fisheries.

AMERICAN LITTORAL SOCIETY NEWSLETTER, American Littoral Society, Sandy Hook--Highlands, N.J. 07732 Irregular.
Society activities, programs, and plans including field trips, meetings, and publications.

AMERICAN MALACOLOGICAL UNION, INC., NEWSLETTER, The American Malacological Union, Inc., 3957 Marlow Ct., Seaford, N.Y. 11783 Published twice yearly.
Free to members.
Society news including announcements of meetings, publications, and activities of its affiliated organizations.

AQUANOTES, Office of Sea Grant Development, Louisiana State University, Baton Rouge, LA 70803 Published five time a year. Free.
Information and news about Louisiana's wetland resources, Sea Grant activities, and related topics.

AQUATIC MICROBIOLOGY NEWSLETTER, American Society for Microbiology, Division of Aquatic Microbiology. Samuel P. Meyers, Editor, Louisiana State University Station, Box 19090-A, Baton Rouge, LA 70803
Society news, job opportunities, publications, and meeting announcements.

ASIAN OCEANOLOGIST, Pacific Business Associates, Ltd., C.PO. less Box 1425, Tokyo 100-91, Japan Published monthly.
News about significant maritime events occurring in the Far East, the emphasis being on the development of natural resources.

BIOLOGICAL BULLETIN is issued six times yearly. It discusses various marine topics as related to specific genus and species of marine life.
Marine Biological Laboratory, Woods Hole, MA 02543

BOATING SAFETY NEWSLETTER, Safety Information Branch (G-BBE-1), Boating Education Division, Office of Boating Safety, U. S. Coast Guard Headquarters, Washington, D.C. 20590 Published monthly.
Tips on boating safety, notices about training courses and navigation aids, news releases, pertinent articles, announcements about laws and regulations affecting boating, and related items.

BULLETIN OF MARINE SCIENCE, William J. Richards, Editor, Bulletin of Marine Science, Rosenstiel School of Marine & Atmospheric Sciences, University of Miami, 4600 Rickenbacker Causeway, Miami, FL 33149 Published quarterly.
Dedicated to dissemination of high quality research dealing with all aspects of marine biology in tropical and sub-tropical waters.

CAROLINA TIPS, Carolina Biological Supply Co., 2700 York Road, Burlington, N.C. 27215
Information and news about various aspects of the biological world and catalogue lists of biological specimens currently available.

CENTRAL ATLANTIC ENVIRONMENT NEWS, Central Atlantic Environment Center, 1717 Massachusetts Avenue, N.W. Washington, D.C. 20036
News about current legislation and planning of the Middle Atlantic region. Also, information about available recreation facilities.

CHEMECOLOGY, Manufacturing Chemists Association, 1825 Connecticut Avenue, N.W., Washington, D.C. 20009
Current news about grants, articles, and committee proceedings of the association. Also, briefs on current legislation affecting industry.

CHESAPEAKE BAY FOUNDATION NEWS, Chesapeake Bay Foundation, Inc., Box 1709, Annapolis, MD 21404
Information on industry, pollution, legislation, grants, and appointments in the Cheasapeake Bay region.

CINECA NEWSLETTER, published for CINECA (Cooperative Investigations of the Northern Part of the Eastern Central Atlantic) by the International Council for the Exploration of the Sea, Charlottenlund Castle, 2920 Charlottenlund, Denmark. Irregular.
News and reports relating to the international program CINECA, sponsored by the International Council for the Exploration of the Sea, the Intergovernmental Oceanographic Commission, the Food and Agriculture Organization of the United Nations, and others. Published in French and English.

COAST AND BAY BYLINES NEWSLETTER reports on developments of the proposal for the Coastal Zone Management Program for Maryland's Coastal Areas.
Maryland Department of Natural Resources, Tawes Office Building, Annapolis, MD 21401

COASTAL MANAGEMENT PROGRAM NEWS is a bi-monthly report containing news of interest to all concerned with the proper management of Delaware's coastal resources, specifically focusing on the development of the State's Coastal Management Program.
Office of Management, Budget and Planning, Post Office Box 1401, Townsend Building, Dover, DE 19901

CONSERVATION EDUCATION ASSOCIATION NEWSLETTER relates promotional news of the environment in education. Claude Crowley, Editor, Post Office Box 60567, Fort Worth, TX 76115

CONSERVATION FOUNDATION LETTER, Conservation Foundation, 1717 Massachusetts Avenue, N.W., Washington, D.C. 20036
News on foundation activities, articles, and grants.

CONSERVATION NEWS, National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036
Current information on various conservation projects as well as news on pending legislation.

CONSERVATION REPORT, National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036
Information on current government proposals and legislation and updates on grants and projects presently underway.

CRWR NEWS, Center for Research in Water Resources, University of Texas at Austin, Balcones Research Center, Rt. 4, Box 189, Austin, TX 78757
Published quarterly.
News about the activities and projects undertaken by the Center, personnel, courses offered, publications available, and project events.

CSK NEWSLETTER, Japan Oceanographic Data Center, Hydrographic Department, Maritime Safety Agency, Tokyo, Japan Published monthly.
News and activities relating to the international program Cooperative Study of the Kuroshio and Adjacent Regions, sponsored by the Intergovernmental Oceanographics Commission. Important to the newsletter are the cruise reports now reported on the recently accepted ROSCOP (Report of Observations/Samples Collected by Oceanographic Programs) forms, which are reproduced in the newsletter.

CUEA NEWSLETTER, CUEA (Coastal Upwelling Ecosystems Analysis) National Coordination Center, Duke University Marine Laboratory, Beaufort, N.C. 28516
Successor to CUE NOTES, formerly published by the School of Oceanography, Oregon State University. The CUEA NEWSLETTER is designed to keep program personnel and other interested persons informed about major events and accomplishments of the project. In addition to news about events, meetings, and personnel, it includes short articles from participants. CUEA is a program under the IDOE (International Decade of Oceanographic Exploration), supported by the National Science Foundation.

CURRENTS, Sea Grant Communications, 418 Administration Building, Oregon State University, Corvallis, OR 97331 Published every 2 or 3 months.
Articles of interest to Oregon's commercial fishermen and news about Oregon's Sea Grant and Marine Advisory programs. Recent publications are listed.

DATA BUOY TECHNICAL BULLETIN, National Oceanic and Atmospheric Administration, NOAA Data Buoy Office, National Space Technology Laboratories, Bay Saint Louis, MS 39520 Published quarterly.
Information about data buoy technology and application, including buoys developed by the NOAA Data Buoy Office and other buoys, and information on projects or programs utilizing buoys.

DECISIONS FOR DELAWARE: Delaware Sea Grant Program, University of Delaware, Newark, DE 19711
Series to outline critical marine problems and to provide alternate methods of dealing with them. Irregular. $3.00 per issue.
-Sea Grant Looks at Oil Spills, Robert B. Biggs
-Sea Grant Looks at Legal Aspects of OCS Development, G. Mangone & J. Homer
-Sea Grant Looks at OCS Development, J. Goodman (Available from NTIS)

DELAWARE CONSERVATION EDUCATION ASSOCIATION NEWSLETTER, Box 45, Dover, DE 19901
News of proceedings, new courses in the field, and curriculum programs for K-12.

ECOLOG, Logical Ecology, Inc., Box 184, Oyster Bay, N.Y. 11771 Published weekly.
News about the environment, such as pertinent laws, economics, technological breakthroughs, consultants, and Federal contracts and sources. The marine environment is included.

ECO/LOG WEEK, Corpus Services, 6 Crescent Road, Toronto, Ontario, Canada
Published weekly.
News about events, legislation, products, patents and processes, and literature relating to ecology, including marine activities. United States as well as Canadian activities are included.

EDS, Environmental Data Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C. 20235 Published bi-monthly.
News about geophysical, atmospheric, and oceanographic programs and data information services available from the components of the Environmental Data Service, including the Center for Experiment Design and Data Analysis, the Environmental Science Information Center, the National Climatic Center, the National Oceanographic Data Center, the National Geophysical and Solar-Terrestrial Data Center, and the Center for Climatic and Environmental Assessment.

ENVIRONMENT REPORT, Trends Publishing, Inc., National Press Building, Washington, D.C. 20004 Published twice monthly.
Current events relating to the environment, including the marine environment. Contract and grant actions, conferences, and publications are listed. Publisher also cites trends in actions regarding the environment.

ENVIRONMENT REPORTER, Bureau of National Affairs, Inc., 1231 25th Street N.W., Washington, D.C. 20037 Published weekly.
Current events relating to pollution and its control are related, usually by area or State. Pertinent laws, meetings, and contract awards and grants are cited. The marine environment is included.

ENVIRONMENTAL RESOURCE, Massachusetts Department of Natural Resources, Division of Conservation Services, Leverett Saltonstall Building, 100 Cambridge Street, boston, MA 02202 Published twice a month.
News and articles relating to environmental resources in Massachusetts. Marine fisheries, coastal zone management, and marine pollution are among the topics discussed.

EPA CITIZEN'S BULLETIN, U.S. Environmental Protection Agency, Washington, D.C. 20460
Published monthly.
News about activities and events relating to and affecting the environment, and methods taken to control or prevent activities harmful to the environment. The marine environment is included.

EXPOSURE, c/o Dr. Rod Mesecar, School of Oceanography, Oregon State University, Corvallis, OR 97331 Published bi-monthly.
Designed for ocean technologists, EXPOSURE consists of articles about instruments and techniques for ocean exploration and engineering. A column on problems and their solutions is included. Contributions are invited. It is also available from the National Technical Information Service.

FATHOM LINE, Marine Resources Center, South Carolina Wildlife and Marine Resources Department, Post Office Box 12559, Charleston, SC 29412 Published bi-monthly.
News about South Carolina's Sea Grant Program and activities that affect the program.

FISHERY INFORMATION BULLETIN, National Canners Association, 1133 20th Street, N.W., Washington, D.C. 20036 Published weekly.
Information relating to fishery products. Includes notices of meetings, Federal activities, legislative actions and proposed actions, and marketing news.

FLASHES, National Fisheries Institute, 1730 Pennsylvania Avenue, N.W., Washington, D.C. 20006 Irregular.
Institute news and notes about legislation affecting the fishing industry.

FLORIDA CONSERVATION NEWS, State of Florida Department of Natural Resources, 202 Blount Street, Tallahassee, FL 32301 Published monthly.
News about events relating to natural resources in Florida, their use and their conservation. Coastal zone and marine activities predominate.

GATE NEWS, U.S. Gate Project Office, NOAA, Code EA-6, 6010 Executive Boulevard, Rockville, MD 20852 Irregular.
Reports on activities and progress of GATE, the Global Atmospheric Research Program's (GARP) Atlantic Tropical Experiment. Included are plans, changes in plans, ship operation notes, and meeting announcements and summaries.

GEOSCIENCE INFORMATION SOCIETY NEWSLETTER, American Geological Institute, 2201 M. Street, N.W., Washington, D.C. 20037 Irregular.
News about professional activities of Society members and about programs of the Society, many of which concern the marine environment.

GRAPEVINE, Geophysical Services, Inc., address inquires to the Editor, The Grapevine, Post Office Box 5621, M.S. 938, Dallas, TX 75222 Published bi-monthly.
News about company activities and personnel.

GREAT LAKES NEWS LETTER, Great Lakes Commission, Institute of Science and Technology Building, 2200 Bonisteel Boulevard, Ann Arbor, MI 48105 Published bi-monthly.
News about activities of the Commission and other activities pertaining to the Great Lakes. Current references to pertinent publications appear regularly.

HARBOR TIDES, Sea Grant, Grays Harbor College, Aberdeen, WA 90520 Published bi-monthly.
Published for use of commercial fisheries people in the Grays Harbor and Willapa Bay area. Includes news, information about legislative matters, navigation information, and tips on more effective boat handling and fishing techniques.

HAWAII COASTAL ZONE NEWS is published monthly by the Hawaii Department of Planning and Economic Development and contains articles on current matters related to Hawaii's coastal environment.
Hawai'i Coastal Zone News, c/o University of Hawaii Sea Grant College, Marine Advisory Program, 252 Spalding Hall, 2540 Maile Way, Honolulu, HI 96822

HYDROCARBONS IN AQUATIC ECOSYSTEMS NEWSLETTER, Bermuda Biological Station, Saint George's West, 1-15 Bermuda Irregular.
Announcements of meetings, cruises, publications, and relevant news items are included.

IDOE INTER-UNIVERSITY FERROMANGANESE PROGRAM NEWSLETTER, c/o Robert Gerard, Coordinator, Inter-University Ferromanganese Program, Lamont-Doherty Geological Observatory, Palisades, N.Y. 10964 Irregular.
Reports on the progress of the program and announces meetings and publications of interest.

IMS NEWSLETTER, Editor, IMS Newsletter, Division of Oceanography UNESCO, 7 Place de Fontenoy, 75700, Paris, France Published quarterly.
News about international marine science-related projects, programs, and activities and about national programs that might be of interest to the international community.

INFORMATION BULLETIN, Pacific Science Association, Bernice P. Bishop Museum, Post Office Box 6037, Honolulu, HI 96818 Published bi-monthly.
Reports on research activities and proposed activities in the Pacific area. Marine science activities are included. Symposia and conferences are announced or reported.

INFORMATION NEWSLETTER, Nova Scotia Museum, 1747 Summer Street, Halifax, N.S. B3H 3A6
Contains information regarding all aspects of science including "How to" information.

INFORMATION NORTH, Artic Institute of North American, 1619 New Hampshire Avenue, N.W., Washington, D.C. 20009 Published quarterly.
News and articles about projects and activities in the Artic, many of which are marine related. Included are announcements of meetings and publications and book reviews.

INTERFACE, Plessey Environmental Systems, 3939 Ruffin Road, San Diego, CA 92132 Published quarterly.
Reports on activities undertaken by the organization in environmental research, including oceanography. Emphasizes use of instruments developed by the Corporation, with special emphasis on the salinity/temperature depth device.

INTERNATIONAL TSUNAMI INFORMATION CENTER NEWSLETTER, International Tsunami Information Center (ITIC), Post Office Box 3887, Honolulu, HI 96812 Irregular.
Information about tsunamis and especially methods to predict them, activities of the ITIC, and events affecting the Center.

ISLANDS, Virginia Coast Reserve, Brownsville, Nassawadox, VA 23413
The official newsletter of the Virginia Coast Reserve, a preserve of the Nature Conservancy.

LERNER MARINE LABORATORY NEWSLETTER, Lerner Marine Laboratory, Bimini, Bahamas (Send requests to Office of the Deputy Director for Research, American Museum of Natural History, 79th Street and Central Park West, New York, N.Y. 10024). Irregular.
Reports on investigations undertaken by the Laboratory, activities of personnel, and visitors.

LITTORAL LINES, Battelle Memorial Institute, 505 King Avenue, Columbus, OH 43201 Published monthly.
News about research in ocean science and marine technology. Includes notes about people, publications, and meetings.

LOUISIANA COASTAL LAW, Sea Grant Legal Program, Louisiana State University, 340 Law Center, Baton Rouge, LA 70803 Irregular.
News about coastal zone management activities in Louisiana, with emphasis on the legal uses of the coastal zone.

MACID NEWSLETTER, Marine Sciences Instrumentation Division, Instrument Society of America, Society Headquarters, 530 William Penn Place, Pittsburgh PA 15219 Irregular.
Information about activities of the Society and news about events relating to marine science instrumentation, people involved with instrumentation, pertinent meetings, and related publications.

MAINE STREAM, Land and Water Resources Institute, University of Maine at Orono, 11 Coburn Hall, Orono, ME 04473 Published bi-monthly.
News about activities of the Institute and about National activities of interest to scientists and other activities relating to local Maine interests.

MAKAI NEWSLETTER is a monthly publication of University of Hawaii Sea Grant College Program and contains a variety of marine education articles including a monthly tide chart.
Makai Newsletter, 2540 Maile Way. Spalding Hall 252B, Honolulu, HI 96822

MARIC BULLETIN, Marine Resources Information Center, MIT Sea Grant Program, Massachusetts Institute of Technology, Room 5-331, Cambridge, MA 92139 Published bi-monthly.
News about acquisitions, activities, and services furnished by the Center and other related information on marine research activities at the Massachusetts Institute of Technology.

MARINE ADVISORY BULLETINS: Delaware Sea Grant College Program, University of Delaware, Newark, DE 19711
An illustrated series featuring various aspects of marine life and Delaware's coastal environment. Published titles include The Blue Crab, Shark, The Pea Crab, To Build a Better (Saltmarsh) Flytrap, Flounder, The Horseshoe Crab, Common seashells of Delaware, Coastal Erosion, Weakfish and Jellyfish. Single copies free. Irregular.

MARINE ADVISORY PROGRAM NEWSLETTER, Cooperative Extension Service--USDA, University of Florida, Institute of Food and Agricultural Sciences, Gainesville, FL 32611 Published monthly.
A Florida Sea Grant publication, the newsletter includes news about Sea Grant and other activities pertaining to Florida's coastal marine areas. It lists available publications, announces meetings and other events, and includes information about people.

MARINE ADVISORY PROGRAMS NEWSLETTER, University of California Marine Advisory Program, Department of Animal Physiology, 188 Briggs Hall, University of California, Davis, CA 95616 Published bi-monthly.
News about the marine advisory programs and especially about the California program and news events of interest to California's marine scientists and fishermen. Includes a list of available publications.

MARINE ADVISORY SERVICE NEWSLETTER, Marine Advisory Service, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882 Published monthly.
A Sea Grant-sponsored publication containing news of interest to local fishermen and information about activities of the marine scientists at the University of Rhode Island. Lists of publications are included.

MARINE AFFAIRS, Sea Grant Program, Allan Hancock Foundation, University of Southern California, University Park, Los Angeles, CA 90007
News about the Sea Grant activities at the University of Southern California.

MARINE ECOLOGY RESEARCH HIGHLIGHTS, Environmental Protection Agency, National Marine Water Quality Laboratory, South Ferry Road, Narragansett, RI 02882 Irregular.
Reports on research activities at the Laboratory.

MARINE FISH MANAGEMENT, Nautilus Press, 1056 National Press Building, Washington, D.C. 20004 Published monthly.
A new (1975) publication of Nautilus Press, the newsletter includes information about Federal activities, Federal and international laws regulating fisheries, pertinent news items, new publications, and meetings.

MARINE INFORMATION TRANSMITTER, MIT Sea Grant Program, Room 3-282, Massachusetts Institute of Technology, Cambridge, MA 02139 Published every 6 to 8 weeks.
News about marine science activities at the Massachusetts Institute of Technology and of related Sea Grant activities.

MARINE MAMMAL NEWS, Nautilus Press, 1056 National Press Building, Washington, D.C. 20045 Published monthly.
News about activities pertaining to marine mammals, particularly existing and proposed legislative and Federal actions.

MARINE MAN, Memorial University of Newfoundland, Saint John's, Canada Published quarterly.
Designed primarily for students, the newsletter focuses on announcement of new publications, meetings, programs, current trends, and research activities of interest to students working in the area of marine/human adaptations. News items are worldwide and not limited to Newfoundland.

MARINE NEWSLETTER, Coastal Plains Center for Marine Development Services, 1518 Harbor Drive, Wilmington, N.C. 28401 Published bi-weekly.
News about marine activities of interest to or within North and South Carolina and Georgia. Information about recent publications is often included, and meetings of interest are announced.

MARINE POLICY REPORTS, SEA GRANT COLLEGE PROGRAM, University of Delaware, College of Marine Studies, Robinson Hall, Newark, DE 19711 Published 6 times yearly.
News on government policies, ocean conferences, and proceedings.

MARINE POLLUTION BULLETIN, Macmillan Publishing, Lt., 4 Little Essex Street, London WC2R 3 LF England; Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, N.Y. 10523 (and Headington Hill Hall, Oxford, England.) R. B. Clark, Editor Published monthly.
This bulletin sets out to cover all aspects of the fight for life of the lakes, estuaries, seas, and oceans. It includes news, comment, reviews, and research management and productivity of the marine environment in general.

MARINE RESOURCE INFORMATION BULLETIN, Virginia Institute of Marine Sciences, Gloucester Point, VA 23062 Published bi-monthly.
Reports on resources in the marine areas of Virginia and other topics of interest to fishermen. Of particular interest are reports on the quality and quantity of oysters and locations of oyster shellstring survey stations. This is a Sea Grant Advisory Service publication.

MARINE RESOURCES ADVISORY SERIES, Virginia Institute of Marine Sciences, Gloucester Point, VA 23062 Irregular.
Published as a part of the Sea Grant Advisory Project. Each issue consists of a topical report on a marine resource of interest to Virginia fishermen.

MARINE RESOURCES DIGEST/MARINE BIOLOGY DIGEST, Girard Associates, Inc., Box 404, Mount Arlington, N.J. 07856 Published monthly.
Reports on current events relating to marine sciences, including activities undertaken by marine research institutions and by individual marine scientists, as well as new products and recent publications.

MARINE SCENE, Douglas Coughenower, Extension Area Marine Agent, Post Office Box 338, Palmetto, FL 33561
A Marine Advisory Program Newsletter, published under the sponsorship of the Florida Cooperative Extension Service, the newsletter is directed toward coastal residents and fishermen in the five southwest Florida counties. It includes news and information about ongoing activities, new publications, tips for marine resource users, meetings, and Federal and State activities of interest.

MARINE SCENE - PANHANDLE EDITION, Jeffrey Fisher, Extension Area Marine Agent, 301 McKenzie Avenue, Panama City, FL 32401 Irregular.
A Marine Advisory Program newsletter, published under the sponsorship of the Florida Cooperative Extension Service, this edition is directed toward coastal residents and fishermen in the nine counties along Florida's northwestern coast. It contains the same type of information as the MARINE SCENE.

MARINE SCIENCE CONTENTS TABLE, Food and Agriculture Organization of the U.N., Fishery Resources and Environment Division, Via delle Terme di Caracalle 00100 Rome, Italy. Published monthly. Free.
This periodical reproduces the tables of contents of core journals in marine sciences and technology.

MARINE TECHNOLOGY SOCIETY, LOS ANGELES REGION SECTION, Marine Technology Society, Los Angeles Section, Post Office Box 227, Northridge, CA 91325
Published monthly.
News about Society activities in the Los Angeles region and items about current events and legislative actions affecting marine sciences in the area.

MARTEK MARINER, Martek Instruments, Inc., 879 West 16th Street, Newport Beach, CA 92660 Irregular.
Descriptive articles about current marine research programs, data collection methods, and marine science instruments.

MML NEWSLETTER, Mote Marine Laboratory, 9501 Blind Pass Road, Sarasota, FL 33581 Irregular.
Reports on activities being undertaken by the Laboratory, which is especially concerned with shark research.

MODE HOT LINE NEWS, Woods Hole Oceanographic Institution, Woods Hole, MA 02543 Published bi-weekly.
News about activities pertaining to MODE (Mid-Ocean Dynamics Experiment), one of the programs under the IDOE (International Decade of Oceanographic Exploration). Also includes brief articles contributed by the MODE investigators. Published by Woods Hole Oceanographic Institution with support from the IDOE Program of the National Science Foundation and the Office of Naval Research.

MOSS LANDING MARINE LABORATORIES NEWS, Sea Grant Advisory Services, Moss Landing Marine Laboratories, Post Office Box 223, Moss Landing, CA 95039 Published bi-monthly.
News of the study and use of the oceans with emphasis on studies carried on by the Laboratories. Announcements of meetings and new publications and seafood recipes are also included.

NAI NEWS, Normadeau Associates, Inc., 686 Mast Road, Winchester, N.H. 03102 Published quarterly.
Information about capabilities and activities of Normadeau Associates in environmental research, much of which are in the marine environment.

NATIONAL FISHERMAN, Circulation Office, Camden, ME 04843
Information on current events of interest to commercial and sport fishermen as well as commercial processors.

NAUI NEWS, National Association of Underwater Instructors, Headquarters, 22809 Barton Road, Grand Terrace (Colton), CA 92324 9 to 12 issues a year.
News about diving activities and marine science research projects of interest to divers.

NEMRIP (New England Marine Resources Information Program), MARINE RESOURCES INFORMATION, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02822 Published monthly.
News and articles relating to marine science research activities in New England with notes about meetings and publications of interest to marine scientists in the area.

NEW PUBLICATIONS OF THE GEOLOGICAL SURVEY, 329 National Center, Reston, VA 22092 Published monthly.

NEWS REALEASE, D.S.D.P. Scripps Institution of Oceanography, University of California, La Jolla, CA 92037 Irregular.
News about ongoing activities of the Deep Sea Drilling Project, including schedules, sites proposed for drilling, personnel, discoveries, and problems.

NEWSLETTER, American Shore and Beach Preservation Association, 10 Rickenbacker Causeway, Miami, FL 33149 Published bi-monthly.
News about events and activities affecting beaches and shorelines, and methods taken to prevent or control erosion; also includes news about relevant meetings and publications.

NEWSLETTER, Association of Sea Grant Program Institutions Secretariat, Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881 Published monthly.
News about actions affecting the Sea Grant program and about institutions involved in the program. Information about actions at the Federal level predominates.

NEWSLETTER, Aquacultural Engineering Laboratory, University of Massachusetts at Wareham, 15A Main Street, Wareham, MA 02571 Irregular.
Designed for the shellfisherman in the New England States, the newsletter describes activities, programs, and projects undertaken at the Laboratory. Publications are listed.

NEWSLETTER, Bermuda Biological Station, Saint Georges West, 1-15 Bermuda Published quarterly.
News about research activities and programs undertaken at the Station. Meetings and publications are announced.

NEWSLETTER, Center for Dredging Studies, Department of Civil Engineering, Texas A and M University, College Station, TX 77843 Irregular.
Information about the Center's activities, including research programs, courses, publications, and personnel.

NEWSLETTER, Coastal Coordinating Council, Department of Natural Resources, State of Florida, 309 Magnolia Office Plaza, Tallahassee, FL 32301 Published monthly.
News about coastal zone matters in Florida and in other States and other news of interest to persons involved in coastal zone activities. Lists of publications issued by the Council and significant publications received by it are included.

NEWSLETTER, Florida Cooperative Extension Service, Marine Advisory Program/Sea Grant Program, G022 McCarty Hall, University of Florida, Gainesville, FL 32611 Published bi-monthly.
News of interest to fishermen and others involved in Florida's marine areas and about the Sea Grant program in Florida. Meetings of interest are announced, and available publications are listed.

NEWSLETTER OF THE AMERICAN FISHERIES SOCIETY, American Fisheries Society, Fourth Floor Suite, 1319-18th Street, N.W., Washington, D.C. 20036 Published bi-monthly.
News about activities of the Society and its several divisions and about national and international agencies and programs that deal with fisheries and the fishing industry. Proposals made at conventions of the Society and related organizations are also presented.

NEWSLETTER, Sea Grant Program, University of North Carolina, 1235 Burlington Laboratories, North Carolina State University, Raleigh, N.C. 27607 Published monthly.
News about North Carolina's Sea Grant Advisory Service.

NEWSLETTER, Sea Grant, University of California, Institute of Marine Resources, Box 1529, La Jolla, CA 92037 Published bi-monthly.
News about Sea Grant and other activities relating to the California coastal area. Includes brief reports on programs, lists of publications, and notices of meetings and other events.

NEWSLETTER, Southern New England Marine Science Association, c/o Stuart O. Hale, Graduate School of Oceanography, University of Rhode Island, Kingston, RI 02881 Irregular.
Activities of the Association and its members; news about other marine research activities of interest to the membership.

NEWSLETTER OF THE COOPERATIVE INVESTIGATIONS IN THE MEDITERRANEAN (CIM) The International Coordinator and The Operational Unit, 16, Bd. de Suisse, MC-Monte-Carlo, Monaco Irregular.
Includes descriptions of subprograms, reports on meetings, reports from national coordinators, resumes of individual cruises, and related articles. The newsletter is a more formal presentation than most newsletters.

NOAA WEEK, National Oceanic and Atmospheric Administration, U. S. Department of Commerce, Rockville, MD 20852 Published weekly.
Articles relating to special research activities, particularly those in which NOAA staff members participate, and staff news. Seafood recipes frequently appear.

NORPAX HIGHLIGHTS, Scripps Institution of Oceanography, La Jolla, CA 92037 Published bi-monthly.
News about NORPAX, the North Pacific Experiment, an IDOE (International Decade of Oceanographic Exploration) program to survey the large-scale oceanic atmospheric systems in the entire North Pacific. Short articles, lists of new publications, and illustrations are included.

NORTH CAROLINA SEA-GRANT NEWSLETTER, Sea Grant Program, School of Public Health, University of North Carolina, Chapel Hill, N.C. 27514 Published monthly.
An indexed list of reports relating to Sea Grant activities or compiled at Sea Grant institutions and deposited in the William Madison Randall Library at the University of North Carolina at Wilmington.

NORTHWEST CURRENTS, Oceanographic Institute of Washington, 312 First Avenue, North, Seattle, WA 98109 Published bi-monthly.
Lists of marine research projects currently in progress in the State of Washington. Plans call for the preparation of annual compendium that will be cross-indexed by organization, investigator, subject, and area.

NISA NEWS, National Security Industrial Association, Union Trust Building, 15th and H Streets, N.W., Washington, D.C. 20005 Published bi-monthly.
Includes information about OSTAC activities (Ocean Science and Technology Advisory Committee of NSIA). Most information in this newsletter is not marine related.

NYOSL NEWSLETTER, New York Ocean Science Laboratory, Montauk, N.Y. 11954
News of interest to colleges and universities affiliated with the NYOSL.

OCEAN SCIENCE LOG, Ocean Affairs Board, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C. 20418 Irregular.
Information about activities of the Ocean Affairs Board (OAB) AND oceanographic activities and projects at the national and international levels. A frequent column "Pelagic Oceanographers" provides information on new assignments of prominent oceanographers. New OAB publications and others of interest are announced.

OCEAN LAW MEMO, Ocean Resources Law Program, University of Oregon Law School, Eugene, OR 97403 Irregular.
Separate articles about topical legal questions relating to uses of the oceans. The Ocean Resources Law Program is a part of the Sea Grant Program.

OCEAN OIL WEEKLY REPORT, Petroleum Publishing Co., Post Office Box 1941, Houston, TX 77001 Published weekly.
News of exploration for and production of petroleum in marine areas throughout the world. Current events relating to the offshore petroleum industry and information about company activities are included.

OCEAN PRODUCT NEWS, Chandler Publishing Co., Post Office Box 45037, Chicago, IL 60645 Published quarterly.
News about marine products and instruments, companies with oceanographic interests, and literature relating to companies and/or products. A request card enabling users to obtain information or literature with ease is included.

OCEAN SCIENCE AND ENGINEERING NEWSLETTER, Ocean Science and Engineering Inc., 1601 Water Street, Long Beach, CA 90802 Published quarterly.
News about company activities in ocean science and engineering.

OCEAN SCIENCE NEWS, Nautilus Press, Inc., National Press Building, Washington, D.C. 20004 Published weekly.
News about current marine science activities, mainly from a political standpoint.

OCEAN SCIENCE ON STATION, Nautilus Press, Inc., National Press Building, Washington, D.C. 20004 Accompanies OCEAN SCIENCE NEWS.
A fact sheet supplementing Ocean Science News, with news about current events, company activities, contracts, publications, and products.

OCEAN SOUNDINGS, Marine Technology Society/American Society for Oceanography, 1730 M. Street, N.W., Washington, D.C. 20036 Published monthly.
Inserted in THE MARINE TECHNOLOGY SOCIETY JOURNAL, OCEAN SOUNDINGS includes information about the Society, its members, and activities of interest to the membership. It is especially concerned with meetings of the Society.

OCEANIC GAME FISH INVESTIGATIONS NEWSLETTER, Southeast Fisheries Center, National Marine Fisheries Service, NOAA, Miami, FL 33149
Published annually.
An annual report on gamefish research conducted by the Southeast Fisheries Center with tables giving catch data.

OCEANOGRAPHY NEWSLETTER, Benson Miller, Editor, Drawer 629, Solana Beach, CA 92075
Contains news of mining, drilling, farming, and populating the sea floor.

OCS UPDATE, Sea Grant College Program, College of Marine Studies, University of Delaware, Newark, DE 19711 Published periodically.
Provides information on Mid-Atlantic oil and gas development.

PACIFIC NORTHWEST SEA, Oceanographic Commission of Washington, 312 First Avenue, North, Seattle, WA 98109 Published quarterly.
News and articles about marine science activities in the State, events that might be of interest to local scientists, recommendations for research projects, announcements of activities and forthcoming events, and news about individual scientists.

PHYCOLOGICAL NEWSLETTER, Phycological Society of America, c/o Norma J. Long, Botany Department, University of California, Davis, CA 95616 Irregular.
News about events sponsored by the Society and activities of members. Especially concerned with the alga and seaweed symposia.

POLLUTANT IDENTIFICATION RESEARCH HIGHLIGHTS, Southwest Environmental Research Laboratory, Environmental Protection Agency, College Station Road, Athens, GA 30601 Irregular.
News items about current research in pollutant identification.

PROFILE: COLLEGE OF MARINE STUDIES AT THE UNIVERSITY OF DELAWARE: Delaware Sea Grant College Program, University of Delaware, Newark, DE 19711
Updated twice yearly.
Includes statistics on staff, faculty, and students and their areas of academic concentration. Also listed are research programs conducted by the College of Marine Studies and Service programs, and descriptions of the physical facilities and research vessels used and operated. Free.

QUALITY OF COASTAL WATERS PROJECT BULLETIN, Sea Grant Program, Water Resources Research Center, University of Hawaii, Honolulu, HI 96816 Published monthly.
Reports summarizing results of research activities relating to the project.

RESOURCE RECOVERY REPORT is a monthly review of current efforts and progress in the process of resource recovery.
Resource Recovery Report, 1707 H Street, N.W., Suite 607, Washington, D.C. 20006

SALMON NEWSLETTER, California Department of Fish and Game, Ocean Salmon Project, Post Office Box 47, Yountville, CA 94559 Published monthly.
Designed for salmon fishermen of California. Includes information about catch statistics; programs for conservation; and legislative, proposed, and regulatory actions.

SCIENCE AND ENGINEERING NEWS FROM NOAA (SEN), National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Rockville, MD 20852 Irregular.
Each issue contains an article relating to a current scientific or engineering project. Marine scientific projects are often covered.

SCOSC PELICAN. Murray D. Dailey, Director, Southern California Ocean Studies Consortium, Post Office Box 570, 925 Harbor Plaza, Long Beach, CA 90801 Irregular.
News of activities involving the Consortium and especially about its members and their research activities.

SCRIPPS AQUARIUM NEWSLETTER, T. Wayland Vaughn Aquarium Museum, Scripps Institution of Oceanography, 8602 La Jolla Shores Drive, La Jolla, CA 92093 Published quarterly.
Reports on Scripps Aquarium activities and marine-related stories and events of interest.

SEA BREEZES, Save Our Seas Newsletter, 245 2nd Street, N.E., Washington, D.C. 20005 Published bi-monthly.
News about activities relating to conservation and good management of the oceans.

SEA GRANT COLLEGE PROGRAM ANNUAL REPORTS, Delaware Sea Grant College Program, University of Delaware, Newark, DE 19711
Illustrated reports explaining research, education, and advisory accomplishments under the Delaware Sea Grant Program. Free.

SEA GRANT NEWSLETTER, University of Hawaii, Sea Grant Publications, Room 253, Spalding Hall, Honolulu, HI 96822 Published monthly.
News about marine science activities in Hawaii, including information about research activities, people, legislative actions, and especially the Sea Grant Program.

SEA GRANT NEWSLETTER, Cooperative Extension Service, Mississippi State University, Box 4557, Biloxo, MS 39531 Irregular.
A Sea Grant Advisory Service publication compiled for the Mississippi-Alabama Sea Grant Consortium and others. Contains news of interest to Gulf Coast fisherman and about activities of the Consortium.

SEA GRANT 70's, Sea Grant Program Office, Texas A & M University, College Station, TX 77843
News about coastal zone activities and the participation of the Sea Grant offices in these activities. A special feature of each issue is a list of new Sea Grant publications with abstracts.

SEAHORSE, Hydro Products, Tetra Tech Co., Post Office Box 2528, San Diego, CA 92112 Irregular.
News about marine science activities, particularly those involving a product of the Corporation, and news about products available from the Corporation.

THE SEA HORSE - BULLETIN OF THE NJ MARINE EDUCATION ASSOCIATION, K. Manger, Editor, NJMS Consortium, Building 22, Fort Hancock, N.J. 07732
Relates news of interest to marine educators, including Consortium notes and events.

SEASCOPE, John M. King, Editor, c/o Aquarium Systems, Inc., 33208 Lakeland Boulevard, Eastlake, OH 44094 Published four times a year.
News and articles about aquaculture projects and the problems in maintaining aquatic organisms in closed circulation systems. Book reviews, publication announcements, and new product information are included.

SFI BULLETIN, Sport Fishing Institute, 608 13th Street, N.W., Washington, D.C. 20005 Published bi-monthly.
News of interest to sport fisherman, including information about meetings, legal matters, conservation measures and management of fishing areas.

SHOALS MARINE LAB NEWSLETTER, Shoals Marine Laboratory, Post Office Box 778, Portsmouth, N.H. 03801 Irregular.
News about the activities of the Laboratory that is sponsored by Cornell University, The University of New Hampshire, and The State University of New York. Conservation of the coastal zone is a major item of interest.

SIGHTINGS, The Mariners Press, Inc., Post Office Box 540, Boston, MA 02117 Published bi-monthly.
Describes books available from Mariners Press that relate to diving, marine life, treasure hunting, shipwrecks, ocean sciences, salvage, and other pertinent topics.

SOUNDINGS: LAW OF THE SEA NEWS AND COMMENTARY, Jessica Mott, Editor, 245 2nd Street, N.E., Washington, D.C. 20002
A bulletin that reports on the news of the U.N. Law of the Sea Conference (UNCLOS) meetings, other marine news and happenings of interest, and other marine group meetings. It is a publication of the Ocean Education Project and the United Methodist Law of the Sea Project.

SPORT FISHING INSTITUTE BULLETIN, 608 13th Street, N.W., Washington, D.C. 20005, Suite 801
Analyzes and evaluates research in fishery science, aquatic ecosystems management and related matters in both fresh and salt waters. Incorporated also are extensive editorial comments based on scientific analyses and studies by the Institute's scientific staff regarding developments that affect conservation of renewable aquatic resources including the marine. Published bi-monthly.

STEVENS INSTITUTE OF TECHNOLOGY, OCEAN AND ENVIRONMENT STUDY PROJECT (OESP), Office of Sea Grant and National Science Foundation, Hoboken, N.J. 07030
A newsletter designed to prepare and motivate selected high school students to enter scientific careers relating to marine sciences.

TAR HEEL COAST, North Carolina Department of Conservation and Development, Post Office Box 27687, Raleigh, N.C. 27611 Published monthly.
News about marine science activities in North Carolina, with emphasis on fishing activities.

TEXAS COASTAL MANAGEMENT PROGRAM TCMP, General Land Office, Austin, TX 78701
Information about the program's activities as well as local news on research and laws.

TEXAS LAW INSTITUTE REPORTER, Texas Law Institute of Coastal and Marine Resources, College of Law, University of Houston, Houston, TX 77004 Irregular.
News relating to legal matters affecting the Texas coast. Announcements of meeting and publications of interest are included. The newsletter is sponsored in part by the Sea Grant Program at Texas A and M University.

TEXAS TRAWLER, Texas A and M University, Sea Grant Program, Rangell Nickelson II, Seafood Technology Specialist, Faculty Mail Service, Post Office Box 155, College Station, TX 77843 Irregular.
News about current research, laws and regulations, equipment and meetings of interest to commercial and sports fishermen, seafood processors, and consumers.

TRIDENT, Marine Advisory Extension Service, Sea Grant, Humboldt California State University, Arcata, CA 95221 Published quarterly.
News about events, projects, and services of interest to local fishermen.

TRIGOM COMMUNICATIONS, TRIGOM: The Research Institute of the Gulf of Maine, 96 Falmouth Street, Portland, ME 04103 Published quarterly.
News about activities of the institutions composing TRIGOM and of other agencies of interest to the community.

TUNA NEWSLETTER, Southwest Fisheries Center, National Marine Fisheries Service, 8604 La Jolla Shore Drive, La Jolla, CA 92037
News of interest to tuna fishermen including notes about scientific research, fisheries assessments and catches, foreign fisheries programs, Atlantic tuna programs, and publications of interest.

26°N 80°W, Dorothy H. and Lewis Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, 10 Rickenbacker Causeway, Miami, FL 33149 Irregular.
News about the marine science activities and educational programs of the school.

UNDERWATER LETTER, Cashman Pulications, Post Office Box 3751, Washington, D.C. 20007 Published three times a month.
Reports on marine science activities, especially those of the Federal Government. Descriptions of marine research facilities are often included. A supplement, entitled "Hydrogram", containing intelligence briefings about marine scientists, new publications, new products and processes, and contract awards is attached to each issue.

UNDERWATER NATURALIST, American Littoral Society, Sandy Hook Highlands, N.J. 07732 Published quarterly.
Marine articles, a conservation page, a coastwatch section for specific sections of the country, a field note section, and a tagging report.

UNFPA Newsletter: Population is a monthly newsletter which covers activities of the United Nations related to population.
United Nations Fund for Population Activities (UNFPA), 485 Lexington Avenue, New York, N.Y. 10017

UNITED STATES DEPARTMENT OF COMMERCE NEWS (NOAA SERIES), U. S. Department of Commerce, Washington, D.C. 20230 Irregular.
Each issue consists of a single news item about a current activity of one of the major components of NOAA, which includes the Environmental Data Service, the National Ocean Survey, the National Marine Fisheries Service, the Environmental Research Laboratories, the National Weather Service, and NESS.

UNIVERSITY AND THE SEA, Texas A and M University Sea Grant Program, W. T. Doherty Building, College Station, TX 77843 Published bi-monthly.
News about marine research activities, principally those in the Gulf of Mexico. Includes information about people, publications, and meetings.

UPDATE, Teledyne Hastings-Raydist, Hampton, VA 23361 Published monthly.
News about Raydist Systems and operations.

URI COMMERCIAL FISHERIES NEWSLETTER, Department of Fisheries and Marine Technology, College of Resource Development, University of Rhode Island. Available through the Editor, NEMRIP, University of Rhode Island, Narragansett, RI 02882 Published bi-monthly.
Information on commercial fisheries in the Rhode Island waters and on marine science activities affecting the fisheries. Supported by the URI Cooperative Extension Service and URI Marine Advisory Service.

USC MARINE AFFAIRS, Sea Grant Program, University of Southern California, University Park, Los Angeles, CA 90007 Published monthly.
News about Sea Grant Programs in general and specifically the program at the University. Includes information about publications produced by the Sea Grant Program.

VIRGINIA MARINE TIMES, Sea Grant Advisory Services Project, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061 Published quarterly.
An advisory newsletter for fisheries personnel in Virginia. Includes news about commercial fisheries activities in Virginia and national news of interest to Virginia fishermen and seafood processors.

WASHINGTON LETTER OF OCEANOGRAPHY, Sea Technology Magazine, 1117 North 19th Street, Arlington, VA 22209 Published bi-monthly.
News and remarks about activities of the Federal Government in marine sciences and other items of general interest.

WATER NEWSLETTER, Water Information Center, Inc., 44 Sintsink Drive, East, Port Washington, Long Island, N.Y. 11050 Published twice a month.
Information about water supply and conservation and waste disposal as it relates to water. Although not marine oriented, it includes information about marine areas.

WETLANDS INSTITUTE NEWSLETTER, The Wetlands Institute, Box 91, Stone Harbor, N.J. 08247
Relates the activities of the Institute, which is sponsored by Lehigh University.

WOODS HOLE NOTES, Woods Hole Oceanographic Institution, Woods Hole, MA 02543
Published bi-weekly.
Specializes in activities of the Woods Hole staff. To date, the lead article in all but one issue has been a biographical sketch of a staff oceanographer.

WORLDWATCH PAPERS are a series of papers issued by the Population Reference Bureau on a variety of topics related to the environment and population.
Population Reference Bureau, Box 35012, Washington, D.C. 20013

Sample Relationship Between Goals and Objectives

Foundation Program Objective III

Develop decision-making and problem-solving skills.

Essential Competency 8

Reach reasoned solutions to commonly encountered problems.

Program Goal

The goal of Environmental Education is to develop an environmental literate and enlightened society which, through its ethical commitment to wise use of its resources, creates and maintains optimum quality in both human-made and natural environments.

Program Objective

Students should develop skills in coping with environmental problems.

Performance Expectation
Grade 8

Predicts the effects social, political, and economic changes would have on the environment.

Content of the Instructional Program
Areas of Concern

Human Populations
Resource Depletion

Concepts
Social-Intellectual, Terrestrial, Total Human

Instructional Goal A

Students will support and practice wise utilization of traditional sources of energy and also support research and development of alternate energy sources.

Instructional Objective Number 13

Provided with the necessary experiences, data and information, students will project the effect of a changing world population on future energy supplies.